A Latourian inquiry into value in equity markets

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PREFACE AND ACKNOWLEDGEMENTS

To Jo, for drawing the value in all connections and Dieb, for modelling them.

KEY TERMS

Bruno Latour; Actor-Network Theory; Neoclassical School of Economics; Value; Equity Markets.

ABSTRACT

Arguably, shareholders, asset managers, economists and businesses are more concerned than ever about the erratic value of their investments in 2020's turbulent equity markets. While these concerns had materialised in the years before the COVID-19 pandemic, they have been exacerbated by the virus' global effect.

These investor insecurities have proven to emphasise an enduring uncertainty relating to how we ascribe value in our markets and the limits of the prevailing Neoclassical School of thought, as applied within financial and investment modelling. In contributing towards a reassessment of the prevailing thought, this dissertation explores the work of Bruno Latour into the philosophy of economy. This research proposes that Latour's Actor-Network Theory, amongst other contributions, may help us better understand and assess the concept of value within equity markets, particularly in South Africa.

By employing the diacritical hermeneutical method of Richard Kearney, this dissertation firstly develops a brief narrative of the development of the Neoclassical School of Economics, the School's understanding of value, and then engages this narrative with Latour's critique of the Economic Sciences. Secondly, the unique contributions of Latour are considered through his formulation of the Modern Constitution, his Actor-Network Theory and Actor-Network Theory's existing applications to market environments. Beyond emphasising the existing limitations of the Neoclassical School of Economics, Latour's treatment of, and suggested approach to, assessing overlooked factors toward value are considered. Throughout, Latour's contributions are considered and paralleled with existing Sustainable and Responsible Investment practices which, alongside Latour's work, will be used to reinforce this alternative concept of value within equity markets.

In achieving these aims, this dissertation does not give an exhaustive or comprehensive review of the Neoclassical School of Economics or the works of Latour. While such surveys deserve their place, this dissertation is more interested in how Latour's work can have a praxiological contribution to our evaluation within equity markets. The works of Latour are also only considered insofar as they contribute towards his critique of Economics or his understanding of value. In so doing, this dissertation provides a novel application of Latour to the Neoclassical School of Economics as considered within equity markets. It then situates Latour's existing critique of the

Economic Sciences within this sphere specifically and articulates Latour's critique within this environment. Beyond framing greater application of Latour's philosophy in equity markets, his contributions and critique are considered in supporting existing Sustainable and Responsible Investment approaches.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

During 2019, the International Monetary Fund recognised elevated levels of market instability which led King (2019:15) to dedicate the 2019 Per Jacobsson Lecture to discuss the failure of our economic models, emphasising that in our increasingly "turbulent times, expectations really matter". The 2019 financial year saw many examples of turbulent times. The Hong Kong Stock Exchange, for example, fell by 78% in one week (Bloomberg, 2019b) and Argentina's S&P Merval Index dropped by 35% in a single day (Meredith, 2019). Locally, the volatility of markets in South Africa had preluded global instabilities from as early as 2018. Coming from a "dismal December for retailers" in 2018, the first quarter of 2019 had the South African economy "stumbling" (Stats SA, 2019a). The Johannesburg Stock Exchange's (2019a) All Share Index closed 183,94 points lower in August 2019 compared to August 2018, while the local unemployment rate was 1.4% higher, totalling 6,7 million people looking for work (Stats SA, 2019b).

Crucially, 2020 accentuated market volatility in South Africa and globally from mid-February which unfolded as the start of a worldwide pandemic, due to the novel Coronavirus (COVID-19).[1] From the start of 2020 the Coronavirus has sparked downward global market sentiments, further fuelled by the oil price plunge of March 2020 where crude prices plummeted to the lowest levels in history (IMF, 2020). The resulting unprecedented economic fallout continued during the ensuing months and, in June 2020, the World Bank (2020) projected that the global economy would enter the "deepest recession since the Second World War". Highlighted by the impact of the Coronavirus, South Africans saw many once trusted investment vehicles "lose billions in value" for shareholders as their stock prices plunged from 2019 and continue into 2020 (Bloomberg, 2019a).

Globally, the initial months of 2020 had international markets questioning how "COVID-19 developments exerted such powerful effects on the stock market since late February" (Baker *et al.*, 2020:4). For Bryan *et al.* (2012:299), periods of economic uncertainty "provide the ideal occasion for a fundamental rethinking about economy and society". These international developments have brought the shortfalls of our economic systems to the fore and restated the need to review "how prices and value operate in actual capitalist economies" (Spash, 2020). The

[1] The Coronavirus, officially known as the SARS-COV-2 or the COVID-19 virus, is an zoonotic virus which was officially identified by the World Health Organisation during December 2019 (Porcheddu *et al.*, 2020:125).

World Economic Forum Agenda has echoed this point in suggesting that the "assumptions that underpin modern economics need reviewing" (Basu, 2020). Accordingly, this dissertation questions existing assumptions within the Economic Sciences and considers the inclusion of new approaches in equity markets.

Gray (2009:6) argues that "philosophical beliefs underpin much of the debate" regarding investment crises and the increased volatility of the equity market has only served to elevate the philosophical substructures of investments (cf. Callon, 1998a:2; Gippel, 2013:128; Gray, 2009:6; MacKenzie, 2006:6;21). Thus, while initially these questions seem to reside within Economic Sciences, pressing further, one finds that the central issue requires a philosophical evaluation. A philosophical approach also provides an outside perspective from the Economic Sciences, and uniquely contributes to the deliberations therein (Hardie & Mackenzie, 2007:59; Seligman, 1971:1).

A philosophical inquiry does not imply that recent movements do not contribute to the field of Finance. Instead, an investigation into the basis of equity markets could assist investors in differentiating and analysing information from a philosophical foundation (Gray, 2009:7). More notably, such an inquiry can explore the interrelated nature of equity markets from an alternative perspective to uncover and deepen our knowledge therein (Gray, 2009:10).

Practically, the causes of inaccurate lapses in market pricing are still debated. Some suggest that the inaccuracies are created by the ineffective valuations of economic models while others suggest the redundancy of the models themselves (Muniesa, 2012:27). However, the *de facto* framework applied in financial modelling for investment and financing approaches – the Neoclassical School of Economics – has remained unchanged despite these inaccuracies (Coleman, 2016:15; Cronqvist & Pély, 2019). Because the Neoclassical Economic School's foundations are central to investment and financing, it will form the chief object of inquiry within the initial portions of this dissertation.

Despite the continued use of Neoclassical economic approaches, it is widely acknowledged according to Ross (2002:130) that "Asset pricing does not fare […] so well in empirical testing and here even the most ardent of advocates must admit that there is much that we do not understand". The inaccuracies in asset pricing, at the hand of the Neoclassical economic approach, underscore some of these limits. Nonetheless, informed and contrasted with the Neoclassical school, contemporary mathematical models used within the market have matured, and more recent heterogeneous approaches to the field have been developed which seek new meanings (Callon, 1998a:2; Gippel, 2013:125). Some more novel approaches also consider the market from alternative perspectives to mathematical modelling and further the movement "to incorporate the

'social' in a more meaningful way […] to more fully understand financial market behaviour" (Gippel, 2013:142). Until recently "the 'social' [was] essentially excluded from Finance research" and markets were analysed almost wholly based on mathematical models (Gippel, 2013:129; MacKenzie, 2005:555). One example of research that extends the 'social' role in Finance is Science and Technology Studies.

Science and Technology Studies, or more simply 'Science Studies', are an eclectic collection of specialisations, including philosophy, which broadly focuses on understanding the influence of science and technology without one specific approach (MacKenzie, 2005:555). Briefly, Science Studies considers "knowledge in its various spaces of production and use" and refocuses philosophical issues in empiricism (Benzecry *et al.*, 2017:9). Due to the widespread application of Science Studies, its form has been refined within the specific disciplines utilising it as a method. For example, the increasingly technologised nature of Finance has seen a Science Studies approach aptly situated towards understanding financial markets (Gippel, 2013:139; MacKenzie, 2005:557).

Social Finance draws significantly from "social network theories" and was developed considerably in Science Studies (Gippel, 2013:126; MacKenzie, 2005:555). Specifically, this study will focus on one well-known author within Science Studies: Bruno Latour (b. 1947), with noteworthy focus on his Actor-Network Theory (Hardie & Mackenzie, 2007:57).[2] Latour is recognised as a founding member of Actor-Network Theory, which had subsequently become a popular method within the social sciences (Harman, 2014:ix).

Latour and Actor-Network Theory, which Latour developed alongside sociologists John Law (b. 1946), Michel Callon (b. 1945), and some notable others, are unique in both being applied to markets and simultaneously being critiqued for reaffirming Neoclassical assumptions therein (Lezaun, 2017:307; Muniesa, 2015:80).[3] While Latour's Actor-Network Theory has been applied widely as a method, this dissertation advocates in contrast that by employing Richard Kearney's (2011) diacritical hermeneutical method, Latour can provide unique insights into understanding the Neoclassical School of Economics, its development, as well as subsequent approaches in light of our current (economic) environmental crisis.

For this reason, this study firstly creates a narrative of the development of the Neoclassical School of Economics and contemplates some of Latour's chief considerations alongside it. This approach focuses on individual aspects of the Neoclassical school and its development to highlight Latour's

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2 Referred to as either Actor-Network Theory or ANT below on p10.

3 See for example Bryan *et al.* (2012) or Lezaun (2017) on Actor-Network Theory's application and critique within markets.

specific contributions. Thereafter, the Third Chapter unpacks Actor-Network Theory, as told by Latour, and considers its insights when applied to the market. Actor-Network Theory's existing applications to markets solidify its contributions and is then extended to consider existing market approaches which Latour's philosophy supports in the Fourth Chapter.

Latour's Actor-Network Theory is opportunely situated to contribute towards the ongoing debate on the philosophical substructure of Finance as it already has had a significant impact in Social Finance (Beunza *et al.*, 2006:724; Hardie & Mackenzie, 2007:58; Wainwright, 2005:115). Although Actor-Network Theory has been applied most prominently within Sociology, it still has application opportunities within several fields, including Finance (David & Halbert, 2014:517; Gippel, 2013:139). Callon (1999) and later, Callon and Muniesa (2005), for example, have considered Actor-Network Theory in Finance, an approach which MacKenzie also matures.[4]

Space for direct interaction between the work of Latour and Finance still exists, and this is a research path that Latour himself is unlikely to take. Recently, Latour has undertaken a new research focus which integrates Actor-Network Theory but is not concerned exclusively with Finance (Harman, 2014:5–-6). Regardless, Latour's examinations include notable commentary on value, the area in which this dissertation focusses. Latour also often critiques the Economic Sciences, and his contributions are expansively considered in this dissertation.

Latour's philosophy cannot be classified into either of the traditional houses of analytical or continental philosophy (Harman, 2009:16). Furthermore, Latour also does not attempt classification according to disciplinary boundaries. Alongside Actor-Network Theory, some of Latour's most significant contributions have been to "the ethnographic description of the fact-making process across technoscience and law; the philosophical critique of modernity; and thoughts on the political ecology of nature", all four of which also find attention and application in this research (McGonigle, 2012:556). Fundamentally, Latour rejects the Aristotelian theory of substance and argues that there exists no underlying essential world (Harman, 2009:24). Instead, Latour (1988:192) suggests that the world exists of actants, which are irreducible to other entities. Anything which can "provide the account of its action" can qualify as an actant (Latour, 2005:53).

All actors are equal and can "transform, translate, distort and modify the meaning or the elements they are supposed to carry" (Latour, 2005:39). Through this process, these interactions are illustrated by the networks between actors (Latour, 2005:39). Since objects can also alter an action in its transfer, actors are not necessarily only human by this characterisation and are then called 'actants' (Latour, 2005:39). Should an object merely transfer an action without modifying it,

[4] See for example MacKenzie (2006).

it would be an 'intermediary', but intermediaries do not form an essential part of an Actor-Network Theory inquiry (Latour, 2005:39). Preferably, Latour (1988:123) suggests an inquiry which focusses on the interactions between entities rather than actions themselves. Latour (2005:39) dubs this interaction as a 'network' and the network is the method of account for the transfer of actions between actors after an action. Importantly, it is only in this transfer of actions that a network unfolds as it cannot be predefined or determined before the fact, quite unlike train or telecommunication networks (Latour, 1996a:369).

Because it classifies the world to exist out of actors, Actor-Network Theory qualifies as 'object-orientated' philosophy (Harman, 2009:24). Latour (2005:117) postulates that this broader recognition places Actor-Network Theory in the field of ontology, as it is concerned with "what the *real* world is *really* like". However, Latour's ontological process is "flat" in the sense that objects and humans are not distinguished, and connections flow indiscriminately between actors or actants (McGonigle, 2012:557). Essentially for Latour there is no hierarchy or chain of being.

An important point to note at this stage is the parallels between Neoliberalism and Science and Technology Studies. Although the definition of Neoliberalism is still a contested topic, and the approaches within Science and Technology Studies differ, the two share "a substantial amount of theoretical orientation" (Mirowski, 2009:429). Although fascinating, the relation between Neoliberalism and Science and Technology Studies is beyond the scope of the present study.[5] Latour (2005:252) does however recognise the similarities between networks and Capitalism. Instead this dissertation provides a critical analysis of the development and application of Neoclassical Economic Theory, as Science and Technology Studies have similarly been used to conceptualise Neoliberalism (see Mirowski, 2009). From this, the foundation is then set in Chapter Four to explore new horizons in understanding our equity markets.

By developing Latour and the Neoclassical School, this dissertation does not critique Capitalism *per se*, yet the research recognises some considerations of how "the ecologies of both humans and nonhumans are being radically made and unmade according to the logic of capitalism" (Latour *et al.*, 2018:578). While not unpacking Capitalism, because Latour *et al.* (2018:587) recognise that there exists a need to understand the impact of Capitalism, Latour's insights therein are considered insofar as they relate to this dissertation's research focus.

In short, Latour *et al.* (2018:591) consider Capitalism through three lenses, which each receive particular attention in our present study. Firstly, Capitalism is contemplated through the 'Sociology of Economics' which is unpacked by Callon and Muniesa (2005) in the Third Chapter. The Fourth

[5] For a comparative of Neoliberalism and Science and Technology Studies, see Hess (2013), for example.

Chapter then highlights that Capitalism should not be understood in light of it opposing ecologism but rather "an involution or a redistribution", which is the second lense (Latour *et al.*, 2018:591). Finally, Latour *et al.* (2018:591) consider Capitalism while allowing for theological arguments, raising the question "Why is it that we invented a way of not being of the Earth". While the question posed by Latour *et al.* (2018:591) is beyond the scope of this dissertation, an approach to consider the earth in equity markets is progressed in the Fourth Chapter by considering the viability of bringing Latour's theory into praxis in existing market approaches. For this reason, a contribution towards the existing "need to critically theorise, conceptualise, and empirically study this (un)making, to bring the dynamics of capitalism and those of human and nonhuman ecologies into the same analytical frame" is considered practically in the Fourth Chapter of the dissertation (Latour *et al.*, 2018:578). A portion hereof will also express some vulnerabilities in Latour's approach but provides reasoning in its application and emphasises its possible contributions when considered in the market.

This dissertation does not propose an alternative to existing approaches to valuation in markets. Still, it does unpack a narrative of the development of the Neoclassical concept of value and relates Latour's insights to it. Focussing on Actor-Network Theory and financial markets, this dissertation further considers how "the social" has been included in existing equity market methods (Gippel, 2013:142). Beyond the market's management of value, one of the specific aspects which form part thereof is the inability of markets to recognise the impact of corporations. Latour (2017:8) realises that the present ecological crisis requires a "profound mutation in our relation to the world" and provides a direct call to action for the recognition and re-evaluation of the way that we consider the environment and nature. By considering Latour's ecological concerns in the narrative of the Neoclassical conception of value, existing Sustainable and Responsible Investment methods in equity markets are reinforced.[6]

In the equity market sphere, Sustainable and Responsible Investment has had significant growth, but "the advancement of a philosophical platform for such a position is notably absent" (Pelletier, 2010:1890; Sherwood & Pollard, 2019:15). While no alternative is proposed, this research aims at providing "a deeper insight into values and value generation [which] is urgently needed for decision making" with the incorporation of Latour's work (Nuppenau, 2002:34). Latour's ecological considerations find specific attention and this dissertation concludes that Latour's approach can support more contemporary approaches to value in equity markets when considering Latour within equity markets.

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[6] Notably, some approaches seem to be reflected in the market, as sustainable funds have had significant capital inflows during 2020, despite increased market volatility (Stevens, 2020).

There are also practical merits in this undertaking. By developing our understanding of value in equity markets we inhibit “poor management of these resources, poor business strategy and, at a societal level, poor governance” (Arvidsson, 2009:16). Governments, businesses, and institutions that make use of Financial information in determining strategies each benefit from such an inquiry (Beunza *et al.*, 2006:722).

This dissertation investigates the distinct domains of Latour’s work and the Neoclassical School of Economics by plotting both the Neoclassical School of Economics’ understanding of value alongside Latour’s understanding. Our research uncovers the interrelations of the two fields in the process and finally reinforces an existing approach of equity markets in praxis. The Second Chapter contributes to this aim by developing the Neoclassical School and articulating individual interconnections to Latour. The Third Chapter then advances Latour’s philosophy and situates it within a market environment. The penultimate chapter develops Latour’s understanding of value, Latour’s ecological focus, and finally considers Latour’s viability in praxis within existing valuation methods in equity markets.

To articulate this environmental focus, the Neoclassical model is not an adequate starting point, as the school has a rich history, and its development plots its contemporary application. The following chapter provides a brief narrative of the school’s transformation which is followed by an introduction to Actor-Network Theory and Latour’s proposition on value. Collectively, these contributions then trace a possible environmental approach in the Fourth Chapter.

1.2 Problem statement

The recent volatility in our equity markets has stressed the need to reconsider the Neoclassical Economic School’s proposed consideration of value in equity markets. This need requires a thorough philosophical investigation into the theoretical foundations of the Neoclassical conception of value. Therefore, this dissertation asks the following question: “What can Latour contribute to the nature of value within equity markets, specifically, and the global economy, broadly?” and “In what way can a revaluation of value provide greater recognition of ‘the social’ to existing modes of economic exchange?”.

1.3 Hypothesis

Latour’s philosophy provides uniquely critiques the Neoclassical Economic School and provides additional grounding to contemporary Sustainable and Responsible Investment measurements based on Actor-Network Theory’s ability to become a “template for the articulation of an empirical response to the environmental preoccupation” (Muniesa, 2019:59).

1.4 Research objectives

In developing the interconnections between the Neoclassical School of Economics and Latour in theory, this dissertation's main objective is to plot a convergent approach towards valuation within equity markets. This dissertation also has the following secondary research objectives:

1. To bring the underpinnings and development of the Neoclassical School of Economics in diacritical relation to Latour.
2. To situate Latour within a market environment.
3. To describe the viability of Latour's ecological attitude when applied to the Neoclassical theory of value in equity markets.

1.5 Literature review

This dissertation focuses on Latour's specific contributions and each chapter's introduction provides an evaluation of the literature it considers and the reasoning for individual inclusions. At the same time, several intriguing authors have engaged Latour's Actor-Network Theory, its application to market environments, and the possibilities of using it in commenting on capital.[7] Moreover, significant research exists which explores the social aspects of value which the Third Chapter of this dissertation also considers.[8] The development of economic value has also been subject to voluminous inquiries.[9]

Latour's *We Have Never Been Modern* (1993) is primarily used to introduce Latour's non-modernism and *Reassembling the Social: An Introduction to Actor-Network-Theory* (2005) for unpacking Actor-Network-Theory. *Science in Action: How to Follow Scientists and Engineers through Society* (1987) is then considered as the basis from which Latour's 'centres of calculation' develop his understanding of value, and *Politics of Nature: How to bring Sciences into Democracy* (2004) is used to unpack value alongside Latour's political ecology further. *Facing Gaia: Eight Lectures on the New Climatic Regime* (2017) then brings Latour's ecological considerations to the fore and is considered within the Economic Sciences in Chapter Four. Notably, Latour's *An Inquiry into Modes of Existence* (2013) is not considered explicitly because this dissertation is not

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7 See Muniesa (2019) for an introduction or Muniesa *et al.* (2017) for a more detailed formulation. See, for example, Beunza and Stark (2012) for an application of Actor-Network Theory within quanitative Finance or Shim and Shin (2016) for an application within the financial technology industry.

8 See, for example, Muniesa (2017) for an introduction or Davis (2006) for a possible scoping of its limitations.

9 For an exhaustive account of the development of the theory of value before the Classical Economic conception, please see Sewall (1901). For more depth on the development of value and its (arguably) Theological origins, please see Hengstmengel (2019) and for a more general overview of the development of economic thought prior to Feudalism see Gordon (1975) or Hutchison (1997).

concerned with developing Latour's metaphysics beyond its application within markets, which is adequately articulated in Latour's other works. Although *An Inquiry into Modes of Existence* (2013) repositions Actor-Network Theory and categorises Latour's politics into specific *Modes*, within *Politics of Nature: How to bring Sciences into Democracy* (2004) Latour's politics is developed sufficiently to situate his theory into markets for this dissertation (Harman, 2014).

Additionally, an alternative definition of economic valuation is not proposed by this dissertation as the concept extends beyond the environment of the markets which this dissertation's primary context (Doganova, 2019:259). However, this dissertation anticipates that its finding may apply to other environments, and will raise some potential connections or access points as they come to the fore.

Supporting pieces, as developed by Latour and others, are considered insofar as they contribute towards understanding Latour. Chapter 3.4 considers the authors critical of Latour's opinions and are used to develop and scope Actor-Network Theory. In situating Actor-Network Theory in economic markets, Callon's (1999) *Actor-Network Theory – The Market Test,* as well as Callon and Muniesa's (2005) *Economic Markets as Calculative Collective Devices,* are used because Callon's approach is "rooted" in Actor-Network Theory (Hardie & Mackenzie, 2007:57).

This dissertation also makes use of several books and articles which are primarily based either in Economic History and Thought or Neoclassical Economics to unpack the development of the Neoclassical School of Economics. Focusing on Sustainable Finance and Investment, this dissertation additionally considers, Ecological Economics, Philosophy, Sociology, and Finance, in order to develop an interdisciplinary diagnostic which facilitates "better understandings of theories and concepts" like the Neoclassical School of Economics (Sands, 2018). All included texts are retrieved electronically from the North-West University Library databases or physically from the North-West University Ferdinand Postma Library, located in Potchefstroom, South Africa.

1.6 Demarcation of the field of study and definition of terms

Latour's philosophy touches upon various disciplines and at times employs different methods and approaches. Therefore, it does not fit neatly into either of the Continental or Analytical schools of Western Philosophy. While Latour (2005:88) has been regarded as a 'social constructivist', he disputes this categorisation for being unduly limiting (Harman, 2014:viii). Latour does take reference from some "fellow non-analytic/non-continental" philosophies, and Latour's philosophy is broadly situated within metaphysics (Harman, 2009:6). Given the fact that this dissertation

situates its focus specifically on Latour, metaphysics consequently serves as an adequate demarcation.

Following his appointment at the Paris School of Mines, Latour became one of the initial contributors to what would later become Actor-Network Theory, as unpacked in the Third Chapter (Harman, 2014:viii). Actor-Network Theory itself has been applied to a plethora of disciplines, not all of which are in the Social Sciences (Lezaun, 2017:305). Nonetheless, most "attempts to define ANT tend to fail" (Doganova, 2019:256). When applied to Finance, Actor-Network Theory is generally situated within social studies of Finance (Beunza *et al.*, 2006).[10] Muniesa (2015:80) considers Actor-Network Theory as a "distinctively materialist, radically constructivist approach to social theory and empirical research" in French poststructuralism. For our present purposes, Muniesa (2015:84) also considers more recent developments within Actor-Network Theory as an engagement into political philosophy as a "critique of the intellectual categories of modernity" which Latour (2013) develops extensively. This dissertation finds its scope within this engagement by further critiquing the categorisation of Modernity which Latour uncovers and then considers it specifically in approaches to Latour's Political Ecology.

Consequently, this study's approach to Latour emphasises the roles of actors and networks through Actor-Network Theory but does so as informed by Latour's ecological motivations. While considering Actor-Network Theory's use as a method, our present study will plot its underpinnings to apply them within Modernity's contemporary equity markets and shift the market's focus to environmental considerations and value. Within the Fourth Chapter, it is made clear that value could easily be considered within this environment, yet Latour does not develop the concept in an ecological sense. Importantly, this study does not establish a consistent theoretical development of value but aims at considering the inclusion of Latour's ecological approach within the existing Modern background (Muniesa, 2019:59).

Neoclassical Economics, value, Finance, and equity markets are also unpacked from this field of view and are characterised in the Second Chapter. This dissertation considers equity markets broadly as the systems which link interested buyers and sellers of listed companies with one another while creating a "myriad of listing and investment opportunities" globally (Johannesburg Stock Exchange, 2019b). Given this vast scope, this dissertation can broadly consider a variety of investment tools.

[10] Broadly, Arjaliès *et al.* (2017:11) consider the social studies of Finance to be "the application to Finance not just of economics but of wider social science disciplines".

As part and parcel of this exploration of value within equity markets, this dissertation will utilise the following key terms:

1. Actor-Network Theory: An anti-reductionist approach to plot the interrelations between entites (Harman, 2009:12).
2. Actant: Any entity with the ability to "transform, translate, distort and modify the meaning or the elements they are supposed to carry" (Latour, 2005:39).
3. Network: A scheme used to trace the actions between actants, recognising their interrelations in the process (Latour, 2005:39).
4. Neoclassical Economics: An approach within the Economic Sciences which is utilised to determine how individual firms and consumers maximise their profits or utility through their actions (Black, 1997:318).
5. Value: Within Neoclassical Economics, value is defined as a synonym for the price of a good or service (Black, 1997:492).
6. Equity market: A platform facilitating the trade of ordinary shares or stocks of companies between buyers and sellers (Black, 1997:152,288).

While defined briefly above, each term is considered in more detail in its relevant chapter.

1.7 Method

Economic, social, and political issues are increasingly investigated by an array of academic fields which each considers similar issues from their distinct perspectives (Sands, 2018:128). Grouping, linking, and focussing the views of these disciplines raises questions of transitioning from theory toward practice (Sands, 2018:128). To consider Latour's theory in the market environment, and better enable diverse considerations, this dissertation will make use of the diacritical hermeneutics developed by Richard Kearney (2011). While Actor-Network Theory has been used extensively as a method within markets, Kearney's method is utilised to plot the interrelations between the Neoclassical School and Latour.

Kearney (2003:12) employs diacritical hermeneutics in his investigations in metaphysics and Otherness. Essentially, Kearney's (2003:12) method suggests that contemporary philosophy embraces a "narrative understanding capable of casting rope ladders and swing bridges across opposing extremes". Hermeneutics, in Kearney's (2020:89) understanding, is concerned with "deciphering multiple meanings" which may not be visible initially. In uncovering these meanings, hermeneutics traces the interconnectivity of unfamiliar issues across different disciplines (Kearney, 2003:19 in citing Rudiger Bubner). Uniquely, diacritical hermeneutics navigates the interconnections between dissimilar counterparts without being polarising or unifying (Kearney,

2003:17). Instead, diacritical hermeneutics explores “the other in the self and the self in the other; it supplements the critique of the self with the critique of the other” (Geniusas, 2017:202). In this dissertation, a diacritical hermeneutical approach is employed to cross the divergent paths of Neoclassical Economics and Latour’s philosophy by fostering its interplay within the initial chapters of this dissertation. At the same time, it can then be examined from a more practical perspective within the later chapters.

Given this dissertation’s focus, it compares/considers Latour’s philosophy and the Neoclassical School of Economics during the Second and Third Chapters. The diacritical method then plots a possible approach to incorporate Latour’s philosophy within contemporary equity markets in the Fourth Chapter and provides unique insights into the viability of bringing Latour’s philosophy into equity markets.

For Kearney (2011:2–3), the diacritical method can be interpreted in four facets. The first facet of the method focusses on a critical interrogation of “the conditions of possibility of meaning” and “a critical exposure of ‘masked’ power” (Kearney, 2012:178). The second facet, which has particular importance for this dissertation, is the diacritical function which Kearney (2011:2) proposes in considering opposing meanings. To navigate beyond these divided claims, Kearney (2012:178) emphasises the role of narrative within existing criteria as the second facet. These two facets form the core of the approach used in this dissertation.

The third and fourth facets do not relate particularly to our present study and are only considered in passing. The third facet refers to the technical contemplation of linguistic marks and symbols in differentiating meaning. In solidifying the meaning of Actor-Network Theory, this aspect, as developed by Latour, is unpacked in chapter 3.4. The fourth facet in Kearney’s (2012:179) method gives recognition to the diagnostic role of “reading the body” in distinguishing “between health and disease” which is not developed in this dissertation.

In summary, diacritical hermeneutics articulates “a meaning that begins and re-begins, an awakening that takes the form of a figure that is prefigured and refigured again and again” (Kearney, 2020:94). This diagnostic, in turn, “calls for endless *dialogue*” between possibilities of meaning which Chapter Two and Chapter Three of this dissertation narrate (Kearney, 2020:97). By articulating meaning, diacritical hermeneutics finally “fulfils itself as *applied*” (Kearney, 2020:97). While the practical application of Latour’s philosophy in equity markets is beyond the scope of this dissertation, an existing market approach, Sustainable and Responsible Investment, is considered in Chapter Three and Chapter Four after the necessity for its integration is established in Chapter Two. What will become clear therein is that Sustainable and Responsible Investment has unique similarities to Latour’s philosophy and Latour can provide philosophical

grounds to existing Sustainable and Responsible Investment approaches in equity markets. In this sense, components of Latour's philosophy are brought into praxis through an existing approach in equity markets.

1.8 Ethical aspects

Following the approval of this dissertation's research proposal during a colloquium of the North-West University School of Philosophy on 1 October 2019, the proposal and scope of work was tabled and considered at the Research Ethics Committee of the North-West University Faculty of Humanities. The dissertation was allocated ethics number NWU-01027-20-S7 and was considered a 'No-Risk' study which was permitted to be initiated subject to the NWU's general ethical rules and conditions. The scope of these conditions was adhered to strictly, as well as the framework of the study as set out within its research proposal. However, the contents, opinions, and conclusions of this research necessarily remain those of the author and not that of the North-West University.

CHAPTER 2

FOUNDATIONS: THE NEOCLASSICAL MODEL AND THE ENSUING EQUATION OF VALUE AND PRICE

2.1 Introduction

It is often convincingly argued that our economic systems are the result and 'natural' effect of the development of humanity (Wallerstein, 1976:273). One example which proposes that economic forms develop "naturally" for investors, economists, and traders (Wallerstein, 1976:273) is Adam Smith's ([1776]1976:29) widely cited assertion that "the propensity to truck, barter, and exchange one thing for another" leads to the division of labour. Chapter Two aims to briefly trace this belief's development from its Greco-Roman origins to its more contemporary applications of value in equity markets. Establishing a narrative of how the Neoclassical School developed provides a contrast to Latour's thinking, as Latour routinely builds his arguments in opposition to established frameworks.[11] Furthermore, by applying Kearney's (2003:12) diacritical hermeneutics, a critical evaluation of the challenging propositions provided by Latour can be seen in stark relief. Though it may be too unwieldy to provide a comprehensive genealogy of this 'natural' growth, the chapter will trace some key influences and developments which are interrogated by Latour. While more extensive issues are included in subsequent chapters, this chapter isolates individual portions of Latour's dissimilarity to the roots of Neoclassical Economics and lays bare its foundations. By plotting the key developments, this chapter, therefore, builds a narrative but focuses on individual aspects of the Neoclassical School's development, which in turn provide insights into contemporary equity markets.

This chapter consequently attempts to provide a framework for Latour's contributions to contemporary equity markets by explaining their development and to focus on the impact of Latour's work. Many significant innovations which contributed to the Neoclassical School are not considered. Such an inquiry would also prove beyond the scope of this dissertation as existing literature plots these developments extensively. One notable thinker whom this chapter does not consider is Karl Marx. Although Marx's contributions towards economic thought have been extensive, they have noticeably been ignored by the Classical, and Neoclassical Schools of

[11] Actor-Network Theory, for example, develops in contrast to the Modern Constitution (Latour, 2005:6). Both Actor-Network Theory and the Modern Constitution are developed extensively in Chapter 3.

Economic thought and, given the focus of this chapter, are only mentioned in passing (Milonakis, 2012:247).

Chapter Three then unpacks Latour's claims to meaning, which then move towards practice by moving Latour's insights towards alternative approaches to equity markets in the Fourth Chapter. Nonetheless, merely applying the contemporary understanding of value within equity markets without firstly situating it within its historical context may lead to inaccuracies in its understanding and application (Fourie, 2020:100; Hengstmengel, 2019:112). Moreover, without this narrative specific aspects of Latour's contrasting position is overlooked as the roots of contemporary Economics and the field's understanding of value have deep philosophical underpinnings which necessitate consideration (Busch, 2008:70; Sewall, 1901:542). The economic beliefs of the thinkers discussed correspondingly echo their values and ideologies and, insofar as it contributes towards the development of their conceptions of value, the contexts of the thinkers are also explicated (Hunt & Lautzenheiser, 2011:xix; Mohr, 2015:13).

To introduce the relevant developments of Neoclassical value, the Section 2.2 will trace initial developments, which later advance the narrative which has led to the contemporary understanding of value of the Neoclassical Economic Sciences namely utilitarianism. Aristotle's (1981) *The Politics*, for example, distinguishes between shoes as an object to be worn or exchanged which Adam Smith's value-in-use and value-in-exchange reflect (Hengstmengel, 2019:113; Jaffe & Lusht, 2003:7; Sewall, 1901:2). It will also become clear in Section 2.2 that the distinction between value-in-use and value-in-exchange is "one of the major cornerstones of modern value theory" today, which finds its foundation in the works of Aristotle (Jaffe & Lusht, 2003:7).

Aristotle will also serve as one of the starting points of Section 2.2, which will briefly plot the development of value from its understanding by Aristotle and other Greco-Romans' conception of justice in trade.[12] The Greco-Roman conception is followed by Feudalism, a socio-economic system which allocated the ownership of land occupied by peasants, and the products of the peasants' labour to lords (Fourie, 2020:102). The significance of this portion will become apparent when considering Latour's characterisation of the distinctions made between humans and non-humans. Section 2.3 then considers Mercantilism, which would become the context from which the classical conception of the Economic Sciences matures, followed by the work of John Locke, one of the forefathers of the enlightenment (Tarnas, 2010:333). Mercantilism forms the background for the work of Adam Smith to be developed in Section 2.4 and is followed by

[12] Although such an endeavour is beyond the scope of this dissertation, future research into the connections between Latour and the Greco-Roman social approach towards value may find interesting correlations.

contemporary conceptions of value and utility in Section 2.5. Utilitarianism would later become one of the most prominent ethical theories of the century (Hunt & Lautzenheiser, 2011:126; West, 2006:2). Nevertheless, while the use of the terms utility and welfare have an ordinary meaning, their use by economists is commonly left to each economist's discretion, and it is no longer assumed the case that the meanings imply their ethics (Viner, 1925:639).

Utilitarianism and Neoclassical Economics find expression in the Section 2.5 of this chapter which develops contemporary economists' use of the Neoclassical Economic School and how the theory has advanced (Colander, 2000:128,130). Section 2.6 then considers the approaches of the South African and other economies which gave rise to this dissertation's research, in light of the Neoclassical Economic School. As alluded to above, the South African economy experienced negative growth for a sustained period from 2008 and has subsequently continued to struggle with low growth (Steytler & Powell, 2011:149). This stagnation followed after one of the most prolonged growth periods in South Africa. From 2003, growth averaged 5% and neared 6% in 2007 and created over 1.5 million jobs in the same period (Steytler & Powell, 2011:151).

Despite the lack of growth after 2008, South Africa has remained a key destination for risk allocation strategies for both developed and emerging markets. Nonetheless, the South African "stock market is more volatile than those of many other emerging economies," including other countries with floating exchange rate systems (OECD, 2017:23). In Section 2.6, the facts of subsequent economic developments and the crucial impact of the novel Coronavirus during March 2020 further highlight this volatility and, when contrasted to Latour, emphasise the role that external, non-human factors can have on company share values.

In considering these facts and market developments, one comes to question the nature of value on the equity market as price is no longer determined by the actions of individual companies but by external, unaccounted factors. An approach which could recognise the influence of external market factors on market shares is considered in the Third Chapter following the work of Latour and including Actor-Network Theory. Because Actor-Network Theory does not distinguish between human and non-human actors, its unique contribution to this environment follows, providing insight into our markets from the foundation set in this chapter.

2.2 Theories of value before the classical economic conception

Using Aristotle as its basis, this section traces the foundations of the Neoclassical understanding of value up to the 16th century. It will begin with a brief review of Aristotle's justice in trade while also touching upon the Greco-Roman philosophical tradition, followed by the work of St. Augustine and Aquinas during Feudalism. The impetus of this foundation is that Aristotle, amongst

others, was profoundly influential in establishing Feudalism, Mercantilism, and thus subsequently influential in the development of utilitarianism. In unpacking this development, the works of Latour are also juxtaposed to the thinking of the periods in explaining the seemingly 'natural' development of western economic thought which the following sections further deliberate on. For Latour's critique to be developed, this section provides the theoretical basis for the utilitarian approach to value in Neoclassical Economics.

As alluded to above, Aristotle is recognised as the first thinker to distinguish between value-in-use and value-in-exchange (Hengstmengel, 2019:113; Jaffe & Lusht, 2003:7; Sewall, 1901:2). However, the interpretation of Aristotle still contends, and Aristotelian scholars widely support, a panoply of occasionally differing approaches (Gordon, 1975:53; Polansky, 2012:164).[13] Gordon (1975:53) proposes that the key reason for this divergence is due to how Aristotle considered value, which differs significantly from later medieval and contemporary approaches. Aristotle, unlike contemporary economists, is not concerned with the market's ability to determine pricing (Gordon, 1975:54; Polansky, 2012:165). Rather than focussing on market equilibrium and price determination as developed in the following sections, Aristotle's approach considers value from a social perspective which distinguishes "between various types of justice" (cited by Gordon, 1975:54). Insofar as it relates to pricing, justice follows from the commensuration of proportional resources in the exchanges between market participants (Aristotle, 2009:88; Polansky, 2012:165). Besides reciprocity, Aristotle's ([1980]2009:89) approach to justice in exchange characterises interdependence between members as, "by the exchange that they hold together", both market participants find their needs addressed. Moreover, it is from the basis of these needs that exchange and the market come into being (Polansky, 2012:165). Aristotle's distinctions of justice correspond with most other ancient Greeks thinkers who suggest that market prices require equivalency (Seligman, 1971:5). Should equivalency not exist, through a distortion of reciprocity in trade or unjust pricing, Aristotle's justice would be violated (Seligman, 1971:5).

Trade was not exclusively local for the ancient Greeks, but non-localised trading was strictly regulated during the time and not familiar to most Greeks (Seligman, 1971:3). Because exchange was not on the global scale typical of today's economies, value "could be understood only in the context of social" considerations which took place primarily between different households for the ancient Greeks (Seligman, 1971:1; Gordon, 1975:55). Accordingly, while the focus of this section is the understanding of value, the social and economic contexts which frame the thinking of these periods are also considered to help articulate the understanding of value therein (Hunt & Lautzenheiser, 2011:xviii). Considering this context, Aristotle, as well as pre-Socratic

[13] For an explication of the contemporary interpretations of Aristotle's work regarding value, see Gordon (1975).

philosophers, propose that market prices are situated within a social sphere, that "economic value involves a degree of subjectivity" and pricing is understood as a method to measure reciprocity in trade (Hengstmengel, 2019:113; Polansky, 2012:166).

The localisation of the markets allowed for the establishment of price by agreement, which promoted the expectation that in trade "the rule of equivalency would prevail" (Polansky, 2012:165; Seligman, 1971:4). The rule of equivalency seemingly satisfied both consumer and merchant in the process (Polansky, 2012:165; Seligman, 1971:4). This approach continued until the later decline of the Roman Empire, which predictably followed a decrease in trade and market structures which then reflected minor development of theories of value (Jaffe & Lusht, 2003:10; Sewall, 1901:546). One consideration that is worth noting is that early Christian writings promoted the ancient Grecian model by following a subjective approach which also focuses on the relative value of things based on what "people value and covet" (Hengstmengel, 2019:115). The economic growth of the 11th century, however, would require the re-evaluation of this Christian conception.

The 11th century saw with it the rise of Feudalism in Europe and would continue up to the 14th century, developing some of the basic building blocks of contemporary Capitalism in the process (Fourie, 2020:101; Sau, 1979:809). While the definition remains contested, Feudalism is frequently characterised as a hierarchal social structure which maintained European lords' ownership of "land and the products of labour of their vassals or the peasants who occupy those lands" (Fourie, 2020:102; Moore, 2002:303). Alongside the upsurge of Feudalism during the 11th century, European citizens also experienced an increase in trade (Moore, 2002:303). Moore (2002:303) suggests that the social ordering of Feudalism also shifted focus to incentivise production by rationalising citizens' economic behaviour and gearing it towards development, a cornerstone of modern Capitalism.

Returning to 11th century Economics, the prevailing thought during the period was that the accumulation of wealth was sinful and its increase posed a threat to the prevailing Christian doctrines, similar to the prohibition on lending with interest, or usury during the 19th century (Hengstmengel, 2019:115; Noonan, 1993:675). Christian theologians, however, were mindful of remaining relevant and protecting the economically weak during the development of the 11th century and were forced to reconsider value, price and scarcity in this light (Jaffe & Lusht, 2003:10; Sewall, 1901:549). They believed that their approach ensured that Christian ethics were inculcated within the European economies of the time, protecting the weak in the process and ensuring the continuation of the Church (Hengstmengel, 2019:115).

St. Augustine was a significant influence upon these 11th century theologians and his argument that Christian scripture contains "many positive statements about material valuables"

reconsidered valuables as not sinful *in esse* within biblical texts (as cited by Hengstmengel, 2019:115). With this consideration, as well as Greco-Roman economic rhetoric, St Augustine (2008:212) concludes that the accumulation of wealth is not sinful as long as it is used to the benefit of humanity (as cited by Sewall, 1901:11).[14] Accordingly, St Augustine (2008:212) suggests that by understanding profits as payment for labour, development could be considered a worthy pursuit (as cited by Gordon, 1975:108). After St Augustine, the economic rhetoric of the Greeks and Romans would become more widely cited, and thus Aristotle would find particular focus during the 12th and 13th centuries (Van der Walt, 2017:9). Thomas Aquinas, who was born in Italy during 1225, is one author who particularly considers Aristotle in his interpretations of Christian scripture and contributes to the period's understanding of value (Van der Walt, 2017:9–10).

Aquinas (1990:1541), following Albertus Magnus, proposes that two commodities could be exchanged if the exchange was based on a "just price" (as cited by Jaffe & Lusht, 2003:11). A just price exists if the commodities in exchange have equal value as based on equal amounts of labour and expense – *labores et expensae* (as cited by Hengstmengel, 2019:119; Jaffe & Lusht, 2003:11; Kaulla, 1940:38). Notably, value is equated to labour and expense by Aquinas (1990:1541), which is then reflected in the price as determined in exchange. For Aquinas, a mutual, equal exchange was an essential practice since this requires all parties to have full knowledge of the nature of the commodities in trade and any defects which they may have (as cited by Jaffe & Lusht, 2003:11; Sewall, 1901:553).

Aquinas' proposal also finds its origin in the Greek rule of equivalency in trade and the proposal would remain influential throughout the scholastic period (Gordon, 1975:10, 109; Kaulla, 1940:39). However, Aquinas' influence would extend into later economic thought as well and would form the theoretical basis of the labour theory of value (Kaulla, 1940:54). The labour theory of value suggests that as a commodity's labour increases, so does its value because the requisite labour and expenses determine its value (Kaulla, 1940:54–55). For Aquinas (1990:1541), if value and price are not equal in trade, then the justice of the exchange is lost because the value of the commodity no longer reflects the income its producer is entitled to (cited by Kaulla, 1940:54–55).

Aquinas also contributed to the foundation of contemporary Capitalism by standardising and venerating labour (Gordon, 1975:10, 109; Kaulla, 1940:39). Because the value of commodities is determined in part by its labour expenses, the production of a commodity could be standardised based on the nature of the labour it required. The standardisation of labour, in turn, reflected an

[14] Sewall (1901:11) and Gordon (1975:108) gather their reading of St Augustine from Chapter 16 of St. Augustine's (2008) *The City of God.*

increase in the regulation of prices and the rise of trade guilds, which would later establish and administer minimum prices during the period (Gordon, 1975:220). At the time, market consensus determined a just price (Gordon, 1975:220). However, an alternative, less common approach also developed from within the trade guilds, which suggested that direct regulation, and not market consensus, determined just prices (Gordon, 1975:220). Although this may seem a trivial distinction, the rise of trade guild regulation emphasised the distinction in the market's determination of value to that of trade guilds. The divergence in approaches disturbs the understanding of equivalency in trade by bringing the market price of commodities, which were based on the labours and expenses of its production, into question.

Following the work of Aquinas, economic development continued to rationalise citizens' productivity and saw the rise of Mercantilism (Wallerstein, 1976:276). Furthermore, Wallerstein (1976:276) argues that this development encouraged the perception of Capitalism as a "natural" shift from Feudalism. This perception of the natural advance of human behaviour towards Capitalism would later form part of Adam Smith's understanding of trade's development into commercialisation which Section 2.4 develops. Although this perceived shift found its theoretical basis in Feudalism, Mercantilism practically allowed for the development of industries and will be discussed below (Sewall, 1901:49). Before moving on, it is noteworthy that the belief in economic growth as natural and rational implies the contrary as well since any actions which do not promote economic growth and any behaviour which opposes the development of Capitalism is 'irrational' (Latour, 2017:223).

Adam Smith will be unpacked in Section 2.4, but some of his considerations are included in Section 2.3, including his belief's implications on a feudal, semi-autonomous city. This includes that cities are 'naturally' inclined towards trade and commerce and that Capitalism would 'naturally' develop in cities unless external powers limited free trade (Wood, 2002:4). On the other hand, there have "been a great many towns and a great deal of trade that never gave rise to capitalism" (Wood, 2002:75). Latour *et al.* (2018:596) consider the 'natural' development of Capitalism as well. For Latour *et al.* (2018:596), the combination of Capitalism and modernisation are complementary parts in advocating a singular truth which advances progress and any alternative to this singular truth is considered regressive according to this logic.

Returning to the market, unlike today, the requirement for a just-price would not endure if Aquinas was considered metaphorically, buying low and selling high (Sewall, 1901:552). Interestingly, Latour *et al.* (2018:595) states that the English "invented capitalism" and Wood (2002:98–100), for example, identifies England as one of the first countries to concentrate state power and concretise trade networks during the 16th century. Mercantilism was one of the fundamental steps away from the medieval scholars' consideration of value in terms of justice in exchange. The

development of Mercantilism and the establishment of nation-states during the 16th and 17th centuries refocussed the theory of value to emphasise national development above a just-price (Jaffe & Lusht, 2003:12). While value was considered alongside justice during Feudalism, "the problem is no longer what value should be, but what it is" for Mercantilism (Sewall, 1901:570).

This section began by unpacking the Greco-Roman approach to value in exchange and then proceeded to illustrate the subsequent shift in Feudalism. Importantly, this section illustrates the development of the concept from its socially orientated origins of exchange as based on reciprocity, to the generation of wealth through the development of agriculture, and exclusion. Remarkably, as Aquinas and St Augustine and their interlocutors illustrate, reciprocity in trade remains during the 11th century. However, the increased economic development during the period continued to rationalise the economic behaviour of people and 'naturally' led to the development of Mercantilism. In Section 2.3, this transition will become more apparent with Mercantilism.

2.3 The foundations of the classical economic conception of value

Similar to Feudalism, suggestions of a definition for Mercantilism continue to stir contemporary debate (Conti, 2018:186–187). The term was first made prevalent following Adam Smith's ([1776]1976) *An Inquiry into the Nature and Causes of the Wealth of Nations,* which Section 2.4 develops (Thornton, 2007:454). However, given the term's origins and the following section's focus on the work of Smith, his definition of Mercantilism shall be followed. Essentially, Smith ([1776]1976:558) argues that the "Commercial or Mercantile System" incorrectly attributed wealth to gold and silver, which is merely another commodity on the market.

While wealth was not solely allocated to money and precious metals during the 16th and 17th centuries, it increasingly became the measurement of a country's "wealth and prosperity" (Sewall, 1901:587). Principally, Mercantilism was concerned with the power and wealth of the state, trumping individual welfare and characterising the mercantilists as amoral (Haley, 1936:349). Value, for the mercantilists, was equated to the market price of a commodity, as determined by the supply and demand of a commodity (Hunt & Lautzenheiser, 2011:5). However, the mercantilists also recognised that the use-value of a commodity influenced the demand thereof, and in turn, its value (Hunt & Lautzenheiser, 2011:24). For Smith ([1776]1976:568), the practices of the mercantilists had "distorted the natural order" of economic growth through the monopolisation of trade in the misleading belief that wealth, as constituted by gold and silver, could be attained through a positive balance of trade (cited by Coleman, 1980:775).

During the 16th century, the attention of Feudalism's agricultural development shifted towards the need for a positive balance of trade and increasingly complex networks of trade routes (Conti,

2018:187; Smith, [1776]1976:560). Essentially, Mercantilism attempted to increase state power through the state's unification and its exclusive control of economic activities, chiefly through monetary policies which promote protectionism (Haley, 1936; Smith, [1776]1976:615).

Mercantilism emphasised the importance of trade and, in turn, required trade routes to be secured to ensure national interests, which sometimes required the use of force (Conti, 2018:187; Smith, [1776]1976:573). Smith ([1776]1976:584) suggests that this approach was first established by the Portuguese, followed by the Dutch, and afterwards, Mercantilism developed across the whole of Europe. Latour (2017:186) identifies the 17th century as a turning point for France and the rest of Europe towards the Sciences, and the Nature/Culture divide which would later trace development.

Despite the detached trade morality of the mercantilists, early Christian and Medieval approaches continued to influence subsequent western economic theories of value (Kauder, 1953:564). Two leading schools of thought followed from early Christian writings, mainly following religious lines: intrinsic value and value-in-use (Bonar, 1888:2). These two independent theories of value will be considered briefly before moving on to the foundations of the enlightenment as drafted by John Locke.

Although this dissertation does not assert that religious factors established the two approaches, the religious and cultural correlations between the two theories remain notable. Some authors, however, correlate the independence of the two theories of value to being due to conflicts between the Aristotelian-Thomistic (i.e. Catholic) schools of thought which supported value-in-use and that of the Calvinist (i.e. Protestant) schools which supported intrinsic value theory, as later developed by Adam Smith (Kauder, 1953:565; Prychitko, 2003:390).

The theory of intrinsic value is suggested to have developed from the "Protestant affirmation of […] the holy dignity of one's work" alongside the "Calvinist belief of predestination" which characterised faith and commercial success as mutually beneficial, similar to the Protestant Work Ethic originally proposed by Weber (1992) (see Tarnas, 2010:246). Kauder (1953:565), argues that this approach influenced the Protestant, and especially Calvinist, thinkers of mostly Britain to stress the cost of production as the central determinant of economic value. Thereby, labour was related to value in more than a measure of exchange but the "spiritual tie combining Divine Will with economic everyday life" (Kauder, 1953:567). The approach also recognised opportunity cost and, while acknowledging that an item's market price can fluctuate, suggested that the value of an item was determined by the sum of the means of production which could have been positioned elsewhere if an alternative item had been manufactured in its place (Hengstmengel, 2019:121).

The theory of value-in-use, on the other hand, was supported by the Aristotelian-Thomistic thinkers of mostly Spain, Italy and France and did not emphasise the role of labour but rather the use and the scarcity of items in determining value (Hengstmengel, 2019:121). Their approach focuses value on the ability to satisfy individual needs and not on intrinsic value (Hengstmengel, 2019:121). Kauder (1953:569) further suggests that it is for this reason that the Englishman Adam Smith did not consider his Spanish, Italian and French contemporaries in developing his theory of value or the Classical Economic Theory during the late 18th century's enlightenment (see also Jaffe & Lusht, 2003:5; Sally, 1999:41).

As mentioned above, John Locke laid the foundation of the enlightenment by philosophically refocusing the rhetoric of the time on empiricism and rationality (Tarnas, 2010:333). Locke's theory of property is also an essential economic foundation and is recognised as being "emblematic of a rising agrarian capitalism" by re-characterising ownership to emphasise exchange value above use-value (Sewall, 1901:599; Wood, 2002:109-111). However, exchange value would dominate the economic conceptions of the 19th century while use-value's influence dwindled (Kauder, 1953:573).

Subsequent to his theory of property, Locke ([1690]2015:44) suggested that God had provided humanity with self-ownership and, as an extension, ownership over the toils of their labour (cited by Bell & Parchomovsky, 2005:542). Therefore, a natural right of ownership develops when labour is added to any property because labour isolates and changes a resource from its natural state (Locke, [1690]2015:44) (cited by Bell & Parchomovsky, 2005:542; Wood, 2002:110). Value, for Locke ([1690]2015:48), was added to natural resources through the addition of labour which in turn entitled the ownership of the developed resource.

Market value, on the other hand, was determined by the relation of resources to one another for Locke (Sewall, 1901:599). Changes in market values consequently represented changes in this relation, and not the intrinsic value of a resource (Sewall, 1901:599). Locke argued that the market value of a resource could be established by considering the speed of a resource's trade in comparison to the quantity thereof on the market (Sewall, 1901:600). However, natural resources were not worthless by Locke's ([1690]2015:48) account. A resource's intrinsic value was determined by the utility, supply and necessity of a resource if it was not subjected to labour (Locke, [1690]2015:48). Nevertheless, with labour, a resource forms part of an individual's property, and the labour used to extract it from nature forms the distinguishing factor in determining this ownership (Locke, [1690]2015:48). However, possession extends only as far as labour for Locke ([1690]2015:46) and "the earth itself" should be free to be "subdued, tilled and sowed" by everyone.

For Locke ([1690]2015:46), humanity can “subdue the earth, i.e., improve it for the benefit of life, and therein lay out something upon it that was his own, his labour”. Locke’s clear distinction between humanity and the earth alongside Locke’s ([1690]2015:33) understanding that the “state of nature has a law of nature to govern it” has interesting contrasts to that of Latour. Fundamentally, Locke’s reasoning suggests that the earth exists to be made “productive and profitable” and for this reason, ownership and by extension, value, is generated from labour (Wood, 2002:110).

It will later become apparent that Latour opposes Locke’s reasoning directly when characterising ‘the Moderns’ which, to compare themselves to the premoderns, broadly distinguished between nature and culture, or “matters of fact” and “matters of concern” in Latour’s (1993:87, 2017:164) own words. Together with Locke, the Moderns understand nature as an automatic system with invariable outcomes. Following this logic, nature “cannot dictate to humans what they must do” (Latour, 2017:22). Culture, on the other hand, could influence and alter nature (Latour, 2011a:76). While the premoderns concerned themselves with the connections between nature and culture, the Moderns differentiated the two concepts to frame development (Latour, 2011a:76). This distinction allows the Moderns to track their conception of progress by contrasting themselves to the premoderns, which acts as a benchmark for development (Latour, 2011a:76).

Before developing the Classical Economic School in Section 2.4, note the use of the word ‘producers’ when considering Locke’s work. ‘Producers’ points toward the employer of labour, or the entity that generates products, not the employee (Wood, 2002:112–113). The intention of property, by this approach, therefore becomes focused on the generation of profit and investment and no longer on individual consumption (Wood, 2002:113). In comparison to the mercantilists who accrued wealth through the extraction of resources, Locke laid the foundation for profit generation by increasing the productivity of labour which, on the equity market, is a central consideration when investing (Wood, 2002:113). Locke’s association of the exchange value of property and labour forms the final cornerstone for the “theorisation of capitalist property” and finalises this section’s introduction to the classical economic school (Wood, 2002:111).

The previous section (2.2) laid the foundation of the classical economic school’s theory of value from the works of Aristotle and Greco-Roman tradition. We recognised that the localised nature of trade and Aristotle’s theory of justice led to equal exchange based on value for the ancient Greeks and the Greek conception of value continued until the rise of Feudalism in the 11th century. Following the development of Feudalism, which still supported the principle of just exchange based on value, the concept required a reconsideration of wealth by the Christian theologians of the time as its accumulation was considered sinful. In reaction, Aquinas suggests that wealth

could benefit humanity and this suggestion, in turn, venerated labour and justified profit as the product thereof.

While value was based on theories of equity in exchange during the 11th century, the 16th century reconsiders exchange. It shifts the focus of equity to accumulation, specifically of precious metals. Theories of value during this time would not follow suit and two main theories developed along religious lines: inherent value, and value-in-exchange. Exchange value later becomes the focus of the work of John Locke, who also lays the foundation for the enlightenment of the 18th century. Collectively, these developments establish the historical foundation of the Classical Economic School. The following section (2.4) considers Adam Smith, David Hume and the later development of marginal utility as understood in contemporary Economics, finalising the narrative for Latour's critique.

2.4 The classical conception of value

As previously noted, the conceptions of value before the Classical School of Economics form the background of the work of Adam Smith and other prominent enlightenment thinkers such as David Hume, which this section attempts to frame briefly. Smith is the main contributor to the Classical School of the Economic Sciences alongside David Hume, who was "Smith's primary – though certainly not sole – interlocutor" (Rasmussen, 2017:161). By respecting John Locke's refocus on empiricism, the enlightenment thinkers' collective contributions lay the cornerstones for the Classical School of Economics and continue to influence the Economic Sciences today (Sally, 1999:41). The contributions of the enlightenment which developed the contemporary understanding of value for the Neoclassical School of the Economic Sciences are discussed in this section.

Citing Polanyi, Latour (2004:272) confirms that Adam Smith ensured the divide between nature and culture in 19th century thought which would later become a central tenet in the Moderns' Constitution. The Modern Constitution will be developed extensively in the following chapter (3). For now, this section will bring the parallels between the work of Smith and the Modern Constitution, as characterised by Latour, into contact. A few final contributions to the development of the contemporary understanding of value will then conclude the section. Because the intention of this dissertation is not to provide an exhaustive account of the development of the contemporary theories of value, this section only provides a brief background on the Classical School, with focus on the contributions of Adam Smith. Following the explication of Smith's work, the contemporary interpretations of the Classical School's theory of value follow in Section 2.5.

During the enlightenment, Adam Smith developed an alternative conception of Economics to that of the mercantilists, which would later become known as the Classical Economic model (Dobb, 1973:56). The economic theories of the 18th century gradually failed to account for growing levels of economic industrialisation and Smith's theory "successfully incorporated new facts into its model and gave economists new rules" which the mercantilist theories could not (Seligman, 1971:2). Smith's Classical Economic model was widely believed to "realistically describe what occurred in the market" until the early 19th century, which would have it replaced with the Neoclassical model (Seligman, 1971:2). Despite subsequent developments, Smith, Hume and other enlightenment thinkers still influence our conceptions of private ownership, free trade and self-regulating markets and form the basis for the Neoclassical model (Fourie, 2020:106; Sally, 1999:42).

Smith made significant contributions to the Economic Sciences, yet a noteworthy portion of Smith's work is often not considered in the Economic Sciences in as far as it concerns matters of moral philosophy (Busch, 2008:65). While it is uncommon today, most economists before the 18th century argued in line with their philosophical backgrounds (Kauder, 1953:570). Nonetheless, Smith's work on morality informs his economic theories and are also considered (Busch, 2008:65). Smith and Hume's philosophical accounts developed in conversation with each other (Rasmussen, 2017:162). However, Rasmussen (2017:90) suggests that there were four fundamental distinctions in the moral theories between Smith and Hume: "sympathy, utility, justice and religion".

In contrast to Locke ([1690]2015:33), who quotes from scripture, Smith wrote little on his religious background. Though disagreement exists regarding the nature of Smith's religious beliefs, most texts identify Smith as deistic (Hill, 2001:1; Rasmussen, 2017:15). Yet it is also conventional for texts to propose that Smith's work develops from a theological basis (Hill, 2001:1; Rasmussen, 2017:15). Most commonly, Smith maintained a belief in a single, interdependent universe as created by a monistic, external deity (Hill, 2001:8). Hume, on the other hand, wrote extensively on religion and is well known to be "neither a believer or an out-and-out atheist, but rather, […] a [sic] skeptic" (Rasmussen, 2017:14).

Hume had an Epicurean, secular approach which proposed that "order is achieved endogenously via inner self-regulation and growth" leading to collections of independent systems, rather than one interdependent universe (Hill, 2001:8). This foundation has interesting implications considering the work of Latour. As will become apparent in the following chapters, Latour (2017:99) considers organisms as both altering, and being altered by, their environments. The collective actions and reactions trace the characteristics and territories of other entities within the universe (Latour, 2017:99).

For Smith, “God is cast in the role of the watchmaker”, and when examining nature, so are the workings of the divine (cited by Hill, 2001:10). As with Locke, Smith ([1759]2004:195) does not associate “man” with “nature” but makes a stark distinction between the two. Nature, by Smith’s (2004:193) logic, is designed for the “happiness of mankind, as well as of all other rational creatures”.

This understanding will also receive attention in the Third Chapter of this dissertation, where it is made clear that Latour directly opposes the conception of nature as a static, mechanical entity. Smith proposes that nature operates under a set of laws, sympathy being one thereof and natural liberty another, both of which are developed in what follows below (cited by Hill, 2001:24). Collectively, the laws govern “all forms of human interaction in order to render them benign and useful” (cited by Hill, 2001:14). Smith ([1776]1976:48) further suggests that the rules are followed naturally by humanity and “determine what may be called the relative or exchangeable value of goods”. Accordingly, the laws collectively operate in the form of the invisible hand which orders human interaction and, by extension, the economy and society (cited by Hill, 2001:14).

Smith’s theory of Economics bases itself in the concept of ‘sympathy’ (cited by Fourie, 2020:107; Rasmussen, 2017:90). Sympathy is an innate characteristic in humans for Smith ([1759]2004:17) and, through sympathy, individuals find pleasure. For both Hume and Smith, sympathy is interpreted “to denote a kind of ‘fellow feeling’ with any emotion” of another person (Rasmussen, 2017:90). However, while Hume argues that the fellow feeling develops externally – where one experiences the emotions of another – Smith suggests that the fellow feeling develops internally through identifying with the emotions of another (Rasmussen, 2017:91). Smith’s understanding of sympathy, therefore, prohibits one from ever truly experiencing the emotions of another, while Hume’s understanding does not (Fourie, 2020:107; Rasmussen, 2017:91).

Despite how sympathy is experienced, both thinkers agree that sympathy benefits society despite economic actors’ inherent inclination to self-interest (Busch, 2008:71). While actors gravitate towards increasing their own happiness, they do so from a sympathetic foundation which influences their actions to benefit others and not only themselves (Busch, 2008:71). Accordingly, although human nature promotes selfish actions, Smith ([1776]1976:456) proposes that through the pursuit of individual interests, public interests are promoted naturally. For Smith, the regulative, protectionist policies of the mercantilists were artificial and detracted from the natural, ordered pattern which developed in unregulated environments (cited by Dobb, 1973:39). Fundamentally, Smith suggests that the uninhibited interaction of economic actors would not lead to chaos but toward a natural order (cited by Dobb, 1973:39). Individuals were able to maximise their value by permitting economic actors as broad discretion as possible, a preferable alternative to protectionist policies of the mercantilists at the time (cited by Mohr, 2015:35). When

governments were tasked with producing value, Smith argues that they "tend to be inefficient and wasteful", but if individuals are tasked with the same goal, they tend to be as efficient as possible to "produce the most value for themselves" (cited by Mohr, 2015:35).

Following the mercantilists, the 18th century understanding of wealth consisted of currency as linked to precious metals (Mohr, 2015:3435). Gold and silver were the most popular measure of wealth or economic value during the life of Adam Smith, and he criticised the practice as inhibiting the development of 'Natural Liberty' (Coleman, 1980:775; Dobb, 1973:56; Mohr, 2015:34; Smith, [1776]1976:697). Rather than precious metals, Smith ([1776]1976:549) proposes that economic activity should be geared towards the satisfaction of human wants and that a nation's wealth was determined by its production of goods, which are used to satisfy these wants (cited by Mohr, 2015:35). Wealth was therefore not merely determined by a positive trade balance, as with the mercantilists, but by increases in trade and production which innately led to higher welfare and happiness in society (Fourie, 2020:108). Economic activity and production developed material prosperity and rather than gold and silver, a country's wealth was determined by "the annual production of goods which can be used to satisfy human wants". This is now known as Gross Domestic Product, or GDP (Mohr, 2015:35).

Although consumption is important, it is not central for Smith and his work has three chief virtues, namely "justice, beneficence, and prudence" (cited by Busch, 2008:71). However, Smith's economic theory attempts to maximise the happiness of the individual as "a function of material prosperity" or wealth in so far as it can satisfy human wants (Hill, 2001:12). For Smith ([1776]1976:930), the most important principle in generating wealth was the division of labour (cited by Myers, 1976:564). Smith ([1776]1976:930) believes that an economy which followed this principle would continue to experience labour specialisation and increasing trade volumes which then increased consumption and ultimately happiness. To maximise the efficiency of the market, which would be required to administrate increasing trade, the market would need to have as few governmental obstructions to free trade as possible (Myers, 1976:565). Collectively these three components, "the division of labour, free trade and a limited role for government", allowed individuals the freedom to pursue their own interests and natural liberty and therefore maximise happiness (Mohr, 2015:35).

The three components above benefited all for Smith ([1759]2004:215), who further proposes that the increased consumption of the wealthy increases the consumption of the poor as it contributes towards a comparative wealth distribution between the two classes. Smith ([1759]2004:215) proposes that the distribution of this wealth is undertaken by an invisible hand, but interestingly, profit is never definitively characterised by Smith (Muller, 2003:198). Guided by the invisible hand and sympathy, Smith's conception of the market suggests the creation of an overarching benefit

for society from self-concerning, individual actions (cited by Busch, 2008:70). Smith ([1759]2004:215) suggests that the invisible hand naturally influences the division of wealth when the wealthy:

> "Select from the heap what is most precious and agreeable. They consume little more than the poor, and in spite of their natural selfishness and rapacity, though they mean only their own conveniency, through the sole end which they propose from the labours of all the thousands whom they employ, be the gratification of their own vain and insatiable desires, they divide with the poor the produce of all their improvements. They are led by an invisible hand to make nearly the same distribution of the necessaries of life, which would have been made, had the earth been divided into equal portions among all its inhabitants, and thus without intending it, without knowing it, advance the interest of the society".

While contemporary secular Economics equates the invisible hand to the Pareto efficiency of the market in equilibrium, others have argued that Smith considered the invisible hand as "imposed externally at the moment of creation in inwrought laws of Nature" (Hill, 2001:10).

Importantly, Smith links prosperity and production as requiring time to develop, an essential component of later capital theories in understanding capital generation over time (Dobb, 1973:42). Latour (2005:119) opposes this measurement of progress as the Modern Constitution fails to acknowledge entities which do not conform to the Nature/Culture distinction in its attempts to measure progress. Should an entity have the ability to alter and influence culture but be classified as forming part of nature, the distinction of the Moderns will not recognise the entity (Latour, 1993:30). Nonetheless, "mixtures of nature and culture" exist despite failing to meet the modernist distinction (Latour, 1993:6).

Ironically, through the same drive towards progress illustrated by Smith, more and more mixtures have come to the fore; the accumulation thereof only further emphasises the lack of conformity to the Nature/Culture distinction (Latour, 1993:41). Ultimately, this dichotomy leads to "crisis of the Moderns" where Latour (1993:6) suggests the rejection of the conception as "everything passes between the two".

Returning to Adam Smith ([1776]1976:74), should sufficient capital have been accumulated, it would naturally be used to employ "industrious people" and purchase commodities which could generate additional profit, in turn benefiting society through employment, production, and trade. The value that workers add, on the other hand, consists of the worker's income and the profits from the sale of the commodity, although Smith ([1776]1976:76) admits that these two can differ substantially depending on the industry (cited by Dobb, 1973:45).

As with Aristotle, value is categorised into "value in use" and "value in exchange" by Smith ([1776]1976:48). Additionally, value is also subject to the natural laws and prices are "continually gravitating" towards the 'natural' value of commodities through the competition in supply and

demand (Smith, [1776]1976:87). Artificial values, on the other hand, come into existence when a trade is externally interfered with, mainly by government policies (cited by Dobb, 1973:43–44). The market price of a commodity is therefore determined by the relation between its supply and its demand at any specific occasion on the market, and the price would tend towards the commodity's natural price if no external interference in trade took place (Smith, [1776]1976:85–88). When the market price converges towards the natural price of a commodity, the natural liberty of the market is increased (Smith, [1776]1976:84). Regrettably, Smith does not develop this concept significantly beyond suggesting that the natural price of a commodity should be defined by the supply and demand for the commodity as influenced by "labour, stock and land" (Dobb, 1973:44).

Smith's theory of price has consequently become known as "simple Cost of Production Theory" (Dobb, 1973:46). The theory has a significant implication on wages and value, which Smith ([1776]1976:668) illustrates using corn. Therein, Smith ([1776]1976:668) suggests that corn, which is used to illustrate basic foodstuffs, determines the price "of all other home-made commodities" as it influences the price of labour because labourers need to maintain themselves and their families. Dobb (1973:45) suggests that there are traces of deduction theory of profit within this approach since profit and rent are implied to be 'deductions' to the natural product of labour. Fundamentally, the production of goods for an exchange, rather than for individual use, implies that exchange takes place to acquire other goods (Hunt & Lautzenheiser, 2011:5).

While the mercantilists supported the accumulation of national wealth through precious metals, Smith ([1776]1976:586) argues that the value of gold, like any other commodity, can vary based on the supply and demand thereof. Because of this variance, Smith ([1776]1976:52) suggests that to use gold and silver to measure the value of other commodities is flawed due to its internal variance and, by extension, that the mercantilist approach of linking wealth to money is inappropriate (cited by Dobb, 1973:48). As an alternative, Smith ([1776]1976:59) proposes that the only non-varying measurement that can be used to determine value is labour, the value of which cannot vary.

Analogous of the revolution in the economic theories of Mercantilism, the Classical model began to fail to recognise imperfect flows or to accommodate changes in economic competition and unemployment following the economic changes of the 19th century (Seligman, 1971:2). In recent times this critique has increased, and most contemporary subfields of the Economic Sciences only make use of the Classical model's assumptions insofar as they relate to modelling in each of the subfields (Ross, 2002:136; Solow, 1997:47). Criticism of the Classical Economic model grew over time, and John Maynard Keynes later prominently advocated for government

intervention in economies (Mohr, 2015:36). Nonetheless, Smith's model set the foundation for the Neoclassical School of Economics, a school which continues today (Mohr, 2015:35).

Up to this point, we have uncovered some of the factors which had influenced the changes in the Neoclassical understanding of value. Developing from the foundation of the Greco-Roman understanding of justice in trade, we noticed the shift in the common understanding of value, which was altered with the Feudalists' focus on the accumulation of land for agricultural utilisation. The continued gearing towards human economic behaviour furthered the accumulation of wealth and later entrenched the powers of nation-states through Mercantilism.

Nation-states protected their sovereign wealth in the form of precious metals by using protectionist policies and strong governmental regulation. Adam Smith later disputed Mercantilism's development across the whole of Europe and showed the flaw in their reasoning, arguing that instead of precious metals measuring value, the only viable measure was labour. In doing so, Smith laid the foundation for what would later develop the Neoclassical School of Economics, which the following section (2.5) unpacks.

The penultimate section (2.6) then explores the link between the logic of Smith's classical economic theory and actors merely maximising their happiness, or utility, when exercising choices and the everyday use of utility in Economics (Busch, 2008:66). Other notable contributions to what would come to be the Neoclassical School of the Economic Sciences are also considered in as far as they relate to the work of Latour or develop the Neoclassical School's conception of value. In the next section (2.5), the work of Ricardo and Mill is unpacked, followed by utilitarianism as understood within Neoclassical Economics and finally, a brief introduction to the methods used in the contemporary equity market will find attention. In the Third Chapter of this piece, Latour's work is developed and framed from the scaffolding provided in this chapter.

2.5 Contemporary economic conceptions of value

In the previous section (2.4), it was illustrated that Smith ([1776]1976:586) disregards the mercantilist conception of wealth consisting of precious metals. Smith ([1776]1976:586) argues that the price of precious metals vary with supply and demand with the ease of its extraction – equal to any other commodity. As an alternative, Smith ([1776]1976:59) proposes that the only standard measure of value that could be used is labour and that the market prices of commodities innately gravitate towards their natural value when no market interference takes place. William Stanley Jevons, Carl Menger and Leon Walras are commonly cited as the founders of the new school of Economics following the work of Smith and, collectively, their works would later

constitute founding pieces in the Neoclassical School of Economics (Bowley, 1937:16; Milonakis, 2012:247).

David Ricardo also developed the theory of value within Economics in following Smith, and for this reason Ricardo's works will introduce this section. Ricardo also criticises the Bank of England for its increased production of banknotes, because the production thereof is the main contribution to the fall of the value of the Pound in comparison to other European currencies of the time (cited by Dobb, 1973:67). Ricardo will be followed by an inquiry into the work of Jeremy Bentham, Jean-Baptiste Say and William Nassau Senior; each of whom contributes towards the disregard of the labour theory of value in Economics (Hunt & Lautzenheiser, 2011:125; Milonakis, 2012:247). Jeremy Bentham, as the initial proposer of utilitarianism, is then considered and followed by Thorstein Veblen (1900:261), who coined the term Neoclassical Economics (West, 2006:2). John Stuart Mill, a "direct lineal descendant of Ricardo" then finds attention in the latter part of this section (Dobb, 1973:121). Succeeding Mill, the contemporary understanding of value in markets is developed as flowing from the utilitarian approach of Mill in the final portions of this section.

Today, utilitarianism has a long and fruitful tradition in philosophy which continues to influence a vast number of other fields including law and Economics (Shaw, 2006:201). However, as a philosophical theory, utilitarianism has been subject to a wide range of criticism (Shaw, 2006:201). Within economic philosophy, utilitarianism links the consumption and acquisition of goods with happiness and, although this has brought about significant development, its coupling is contentious (Goudzwaard, 1979:31). After explicating utilitarianism, the role of it as an approach to contemporary equity markets finds attention and is situated within the South African context in the following section (2.6). In developing this narrative, Ricardo introduces the section.

As Smith does with gold, during the early 19th century Ricardo (1815:16) equates currencies to commodities which to him, are also subjected to the forces of supply and demand (Dobb, 1973:77). Following Smith, Ricardo eloquently explained the surplus theory of value by suggesting that profit was the net effect between the "product of labour at the margin of cultivation and the subsistence of that labour" and by substituting corn with labour, Ricardo noticed that a theory of value was implied (cited by Dobb, 1973:74).

As alluded to above, the labour theory of value suggests that exchange value is determined by the total labour required to produce a commodity in addition to the labour which had produced the framework for the commodity's production (Hunt & Lautzenheiser, 2011:50). Smith and Ricardo would agree that a commodity requires use-value for it to have exchange value. However, Ricardo (1815:43) illustrates that the increased production of a commodity reduces the value of a

commodity but also increases the wealth of society through its increased access by the commodity (Hunt & Lautzenheiser, 2011:131).

Ricardo's labour theory of value was short-lived and English economists widely criticised the arbitrariness of relating labour to economic value (Muller, 2003:198). On the other hand, the works of Karl Marx would particularly develop the concept further as the labour theory of value linked "human creativity with an explanation of the capitalist economy" which Marx famously opposes (cited by Muller, 2003:198). Latour (2004:272), in citing Polanyi, recognises that Marxist Economics attempted to rectify the Nature/Culture divide that Smith had helped concretise during the 19th century. Latour (2011a:73) also recognises how Marxist schools "provide a wealth of the same linkages that have been established between material and social conditions". Marxian approaches also consider the "social and political content" of value (Reinecke, 2010:564).

The Neoclassical School, on the other hand, does not consider Marx and would later develop utility as a measure of value (Milonakis, 2012:247). It is for this reason that the work of Marx is not considered within this dissertation. Although the work of Marx is critical in contrasting the development of Capitalism, Marx's work "differs characteristically from all systems of theory that had preceded it, both in its premises and in its aims" and does not form part of the Neoclassical school of thought (Veblen, 1907:299). Marx also argues that an attempt at reconciling Neoclassical Economics with his contributions are "bound to fail" but does distinguish this statement in referring to Neoclassical Economics or "vulgar economics" to that of Classical Political Economy in which he refers to the works of Smith and Ricardo (cited by Milonakis, 2012:247;261). Considering the goal of this dissertation, tracing Marx's work would not contribute towards the understanding of value in equity markets and is therefore not further considered.

Despite the critique on Ricardo, John Stuart Mill would reconsider Ricardo's theory of profit to restate Smith's theory of subjective value. Some authors propose that Mill is the "spiritual heir" of Adam Smith's Economics (Goudzwaard, 1979:30; Milonakis, 2012:247). While profit was the difference between the "value of wages paid to labour and the value of labour's product" for Ricardo, Mill suggests that by recognising the tools, infrastructure and other objects which are required beyond physical labour, the cost of production is more adequately explained (Dobb, 1973:127; 129). The requirements for production, therefore, include the infrastructure and machinery which contributed towards the production of new products (Dobb, 1973:127). Mill ([1844]2000:17) also contributes to the Neoclassical School of Economics in proffering that the supply and demand of a commodity tend to reach equilibrium and that the value of a commodity is simply its exchange value on the market (cited by Hunt & Lautzenheiser, 2011:189).

Moving on toward Mill's utilitarianism and its relation to Economics, the use of utilitarianism as a moral theory has led to significant economic growth and the calculation of utility has been instrumental in the development of the mathematic formulae of contemporary Economics (Fourie, 2020:111; Milonakis, 2012:248). Utilitarianism would later expand beyond Economics and suggests that "actions, laws, policies, and institutions are to be evaluated by their utility" (West, 2006:1).

Even though Mill is a defining author of utilitarianism, Jeremy Bentham was first to propose it (West, 2006:2). Mill diverges from Bentham's 'act-utilitarianism', which emphasised the moral value of individual actions, to 'rule utilitarianism' suggesting that acts take place within a set of rules which have been determined to bring about the highest possible amount of good (Fourie, 2020:110). Broadly, utility signifies the extent to which something is better than an alternative or, more practically, the extent to which something increased happiness and pleasure (West, 2006:1). William Stanley Jevons, Carl Menger and Leon Walras finally moulded a utility theory of value which continues within the Neoclassical school of Economics today – marginal utility theory or the "marginalist revolution" of Economics (Hunt & Lautzenheiser, 2011:249; Milonakis, 2012:247).

Naturally, utility is a subjective measure as consumers will derive their marginal utility from the use of a specific good or service and the Neoclassical School provides no objective measure for utility (Mohr, 2015:122). In the Third Chapter it is made clear that the evaluation of utilitarian actions is *ad hoc* and does not flow from the theory as proposed by Bentham (Callicott, 1984:300). Additionally, the classical utilitarianism proposed by Bentham is anthropocentric and inadequate as an axiological basis given the fact that it is unable to recognise "holistic entities – species, biocoenosis, biomes, and the biosphere itself" (Callicott, 1984:300).

Generally, anthropocentric value theories are characterised as considering intrinsic value to vest in humans solely while other entities find value only in their relations to humans (Callicott, 1984:299). When applied to environmental ethics, anthropocentric value theories naturally skew the interpretation to relate to the effect they have on human beings and consider "human justice, human rights, human duties, and human liberties" (Callicott, 1984:299). When considering Smith's characterisation of development and climate change's threat to humanity, the practicalities of this distinction becomes clear. Simply put, to feed development, the Moderns exploited nature which in turn threatens the continued existence of humanity through global warming (Latour, 1993:8). Culture is not unilaterally impacting on nature; instead, as an effect of progress, culture has impacted but also been impacted by nature creating hybrids in the process.

Considering Finance in light of the Modern Constitution, it seems that the modernist system of belief is deeply entrenched in economic theory, and this is further illustrated in the following. Most economic models, for example, presume that humans are rational, calculating actors with the sole goal of profit maximisation, *Homo Oeconomicus* (Lipartito, 2013:687; MacKenzie, 2006:8). Latour (2017:44) also considers the "*Homo oeconomicus* of the 'modern era'" which he characterises as the distinction between humanity before "having much influence" on the earth and where humanity's influence is directly experienced, as is described in Chapter Four. Besides highlighting the Moderns' urge to progress, the characterisation of such models also presumes a unilateral impact that culture has on nature, following the Modern Constitution. Clearly, the Nature/Culture distinction of the Moderns is illustrated in the ability for rational actors to act and influence other objects unilaterally.

Supporting this unilateral influence, within both Classical and Neoclassical Economics, an "increase in economic satisfactions or economic welfare will contribute to total welfare" of culture (Viner, 1925:640). Following this belief, utilitarianism leads the assumption that consumers "attempt to maximise their satisfaction of wants" with the resources they have at their disposal which, in turn, categorises welfare in terms of utility for both the Classical and the Neoclassical Schools (Mohr, 2015:122; Viner, 1925:640). Within the Neoclassical School, this is further entrenched when utilitarianism links the consumption and acquisition of goods with happiness, fundamentally characterising utilitarianism as hedonistic (Goudzwaard, 1979:31; West, 2006:1). Utility, in this sense, refers to the total satisfaction that a rational consumer experiences by using a particular good or service and the goals of consumers is the "maximisation of utility" (Mohr, 2015:122).

Neoclassical Economics was first defined in *Preconceptions of Economic Science* by Thorstein Veblen (1900:261) in response to the Economics of Alfred Marshall. Although the term was initially not favoured, its use would later become commonplace within the Economic Sciences and today it is still widely accepted as the foundation of the contemporary economic rationale (Colander, 2000:131; Milonakis, 2012:248). Contemporary Neoclassical Economics is characterised by three main assumptions for individual actors: firstly, that they have rational preferences, secondly, that they attempt to maximise their utility while "firms maximise profits", and thirdly, that they act based on complete sets of information (Marinescu, 2016:50).

However, the use of Neoclassical Economics by Veblen (1900:261) does not correspond to its later use which developed in "describing Marshallian Economics. It became associated with the use of calculus, the use of marginal productivity theory, and a focus on relative prices" (Colander, 2000:131). Today, the most common use of the term is to distinguish heterodox economists from "mainstream economists" who practice "modern Economics" (Colander, 2000:133).

Unsurprisingly, “modern economics” is a field which has grown wide and disparate and some of the only commonalities which remain between the various subfields are the approaches used in modelling (Ross, 2002:136; Solow, 1997:47). Because of this uniform approach to modelling, Neoclassical Economics is often described as the “economics of the model” and is vastly different from the Neoclassical Economics as proposed in 1900 (Colander, 2000:138).[15] Accordingly, Neoclassical Economics finds many variations and boundaries are adapted according to preferences (Boulding, 1975:223). For our present study, it is not necessary to unpack the nuanced variations of the Neoclassical School in each subfield of Economics as the matter finds attention solely to be contrasted to the work of Latour. The three main assumptions of Neoclassical Economics, as discussed above, will form the foundation of this comparison which is supplemented by the Neoclassical approach to Finance.

Insofar as it relates to the equity market, the foundations of Neoclassical Economics as adapted to Finance remain unaffected. Not necessarily due to the accuracy of Neoclassical Economics but rather because no suitable alternative has come to the fore (Gibson, 1992:221; Ross, 2005:68–70). For this reason, the term and its contemporary understanding is utilised within this dissertation. The Neoclassical School distinguishes between “cardinal and ordinal utility” which, as the names suggest, purport that utility can either be measured or that it can be ordered or hierarchised (Mohr, 2015:122). Alternatively, the “indifference approach”, succeeds from ordinal utility to suggest that groups of goods and services are bundled and ranked (Mohr, 2015:122). Because utility is used to imply “satisfaction, pleasure, happiness, or whatever the stuff of welfare is thought to be”, satisfaction itself becomes the subjective unit of measure for utility (Viner, 1925:641). Neoclassical Economics values commodities for their ability to satisfy an individual’s needs, which is understood as the commodity’s use-value (Hunt & Lautzenheiser, 2011:5). For capitalist economies, commodities can also have value in order to be sold on the market, which can then, in turn, be used to acquire other commodities which themselves have a use-value (Hunt & Lautzenheiser, 2011:5). The value of any commodity for Neoclassical Economics is therefore related to the price of the object, should it be placed on the market and subjected to the supply and demand thereof (Bodie *et al.*, 2010:xv).

Modern Neoclassical Finance, on the other hand, has two main assumptions namely efficient markets and “no-arbitrage and risk-neutral pricing” (Ross, 2002:129). Fundamentally, efficient markets imply that the information of the market reflects in the pricing of assets as determined by the actors on the market (Ross, 2002:129). Inefficiencies and inconsistencies within the market would then typically be characterised as caused by “some force – usually government – blocking

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[15] See, for example, MacKenzie (2006) for an overview of modelling and its development within Finance.

the market from eliminating them" for Neoclassical Economic Theory (Lipartito, 2013:693). One important distinction between Neoclassical Economics and other common approaches in Finance is their approach to stock price variation. While Keynes famously equated stock market pricing as based on guesswork, "practically any modern finance text" relates stock price as flowing from the "expected present discounted value of dividends" (cited by West, 1988:37). Another difference is the disregard of *Homo Oeconomicus*, a field which behavioural Finance now examines (Ross, 2002:131). The Neoclassical understanding of a rational consumer in Economics is also influenced by Mill, who introduces the concept of *Homo Oeconomicus* (Persky, 1995:222).[16] *Homo Oeconomicus* is "key to unlocking Neoclassical Economics" and is explained briefly below in concluding this section (Sherwood & Pollard, 2019:5).

Mill's *Homo Oeconomicus* is concerned principally with the accumulation of wealth, but also with "leisure, luxury and procreation" and this characterisation of a rational actor is applied in the Neoclassical School (Persky, 1995:223). Although the four concerns above form the basis of *Homo Oeconomicus*' reasoning, rather than limiting the concerns of *Homo Oeconomicus*, Mill ([1844]2000:112) suggests that no theory could comprehensively explain motivation and any attempt at it would prove ineffectual. The development of the Neoclassical understanding of *Homo Oeconomicus* is developed in Chapter Three as an example of the development of a scientific theory.

For the moment it is important to note that Mill does not suggest that *Homo Oeconomicus* is exclusively a rational actor, yet Neoclassical Economics suggests that the actions of economic man are rational and shift focus to the methods in which rational choices are made while financial Economics disregards the concept entirely (Persky, 1995:223; Ross, 2002:131).[17] As Chapter Three develops, Callon (1999:184) also considers the knowledge base on which market actors make decisions and, when it is applied to Actor-Network Theory, the assumption is also found to be flawed. The development of Behavioural Economics criticised this approach and experiments within the field have recognised that actors are not "primarily rationally self-interested" or that the self-interest of actors extends beyond the atomistic individual (Sherwood & Pollard, 2019:5). Development Economics, on the other hand, also critiques Neoclassical Economics' approach insofar as it relates to natural resources because "Neoclassical models are strictly concerned with efficiency and do not address issues related to equity" (Todaro & Smith, 2012:484).

Characterising individuals as entities which attempt to maximise their utility has been subject to significant critique outside of behavioural Economics and probably most famously by Marx (Hunt

16 Although Mill develops the concept through criticism and not explicitly (Persky, 1995:222).
17 This divergence is investigated by behavioural corporate Finance (Cronqvist & Pély, 2019).

& Lautzenheiser, 2011:277). In applying Actor-Network Theory to the concept, Callon (1998a:193) also identifies its limitations when comparing Actor-Network Theory's actors to *Homo Oeconomicus*. What is important for this section is that, *prima facie* the intention of maximising profits fits squarely within the definition of another type of actor: "the functionless owner of a broad portfolio of investment assets" and supplanting the intention to maximise utility with profit, the outlines of asset managers' characteristics can be determined (Hunt & Lautzenheiser, 2011:277). Typically,

> "such an individual, usually working through specialised exchange brokers, is constantly selling some of this stock, buying some of that stock, shifting from short-term bonds to long term bonds, or making perpetual *marginal adjustments* to his or her portfolio of assets in an unceasing effort to calculate rationally the combination of property holdings that will maximise either income through time or the rate of growth in the value of owned assets" (Hunt & Lautzenheiser, 2011:277–278).

To support these shifts, asset managers evaluate their portfolios with a mosaic of models and ratios which attempt to determine share value on the equity market (Bodie *et al.*, 2010:406). Most models attempt to leverage the difference between the determinants of the value of a company's share and its pricing as compared to its competitors when considering the market and the financial statements of the company (Bodie *et al.*, 2010:406). Some of the most prominent thereof are the Capital Asset Pricing Model, Dividend Discount Models, Multistage Growth Models, the Fama Fench Model, Residual Income Models as well as several ratios including the price-to-earnings ratio, the equity cash flow, risk-free rate-adjusted free cash flow, and the equity cash flow ratio (Bodie *et al.*, 2010:406–423; see Dercksen, 2008; Srinivasa Reddy *et al.*, 2013). However, even within these specialised environments, it has been argued that a reciprocal trading relation between firms "often trumps cost as a determinant of how those firms choose to trade" (Arjaliès *et al.*, 2017:9). In considering Actor-Network Theory's application to markets, it is important to note that Callon (1999) identifies the characterisation of actors in the market as an important test of Actor-Network Theory and is developed in the following chapter (3).

Observably, much has changed in capital markets since 1880 and Preda (2002) illustrates that technology had not only played a facilitating role therein but rather, significantly influenced how trading takes place on capital markets. The stock ticker, for example, provided a continual flow of information on the market and made it possible for traders to continuously chart changes in the prices of stocks (Preda, 2006:770). These continued changes could be plotted visually and gave rise to charts which acted as a means of understanding the market and, as such, also constituted the market (Preda, 2006:770). The chart had become a "cognitive instrument" which extended the trader's knowledge of the market (Preda, 2006:770). In the following chapter (3), the impact of non-human entities on the stock market will become more definitive when tracing the proposals of Latour.

While the lists of models and ratios is unbounded, the first principle of valuation within the Neoclassical school remains, and it holds that price is equal to value (Bodie *et al.*, 2010:xv). This section, nonetheless, traced a few of the more common methods of valuation and the assumptions underpinning most Neoclassical methods.[18] In summary, the distinctions between the Classical and Neoclassical School were first made by Senior when criticising the application of Ricardo's method as, for him, it leads to analytical variances in the model's application (Depoortère, 2013:24). Following Senior, utilitarianism is proposed by Jeremy Bentham and takes a further pace from Smith and Ricardo's Economics (West, 2006:2). Say then ushers in a third fundamental step from the work of Smith by suggesting that the use-value of a commodity is exclusively determined by its exchange value (Hunt & Lautzenheiser, 2011:135). These three steps away from the Classical School would later lead to the Neoclassical School of Economics and the use of utilitarianism as a measure of value in the Economic Sciences (Dobb, 1973:121).

In the Fourth Chapter, this approach will be reconsidered in light of Latour's work but for this philosophical position to be fully appreciated background into the equity market environment is firstly situated in the final portion of this section. Besides giving rise to the problems posed in the introduction, the *status quo* forms the foundation of the philosophical underpinnings discussed in the subsequent chapters. This section has contributed towards forming this foundation by tracing the development of the concept of value, following Adam Smith, to more contemporary understandings. Resulting from Smith's Classical Economic Model, the works of Menger, Walras and Jevons, modified the economic model while the works of Bentham and Mill developed a means of measuring utility. Collectively, these contributions formed the Neoclassical School of Economic Thought which is still practised in varying degrees today. In the following section, these principles are situated and considered in the context of the contemporary South African, and global, equity markets.

2.6 Considering value in the South African Equity Market

Unlike the traditional markets of the Greco-Romans, equity markets are concerned with investment, or the provision of capital with the expectation of future returns thereon (Bodie *et al.*, 2010:2; MacKenzie, 2006:38; Marx *et al.*, 2010:3). These contemporary considerations are developed in this section. This section opens by providing brief contextualisation of equity investments followed by a perusal of some of the significant market instabilities which have echoed the importance of this dissertation's goal in furthering our understanding of equity markets. While recent prior crashes in individual shares have mostly been due to the companies themselves, the impact of the Coronavirus (COVID-19) is one of the most poignant examples of

[18] For a detailed background on the development of financial models, please see Mackenzie (2006).

a hybrid influencing and altering the market. The final portion of this section then briefly considers the work of Latour in this context, which is then further unpacked in Chapter Three.

As illustrated above, financial analysis considers the market from the perspective of capital generation, and not in terms of services or goods provided (Muniesa, 2019:60). This extensive definition allows for investments to take various forms, equity markets being only one thereof. For example, one could invest in gold coins or a listed company. Both examples succeed as investments but differ in terms of type: while gold would qualify as a real asset, shares qualify as a financial, equity investment.[19]

Equity investments consist mainly out of ordinary shares (Marx *et al.*, 2010:11) and are generally used by listed companies, in combination with debt, to generate capital to fund the company's growth (Chisholm, 2002:113; MacKenzie, 2006:38).[20] As a result, should a company require money, it would have stocks listed on a capital market to bring companies seeking investment and investors together (Marx *et al.*, 2010:4). Increasingly, this is the general practice for corporations due to the enormous expansion of global companies given that "the size and capital requirements of firms have skyrocketed", and few other methods exist to generate the necessary amounts of capital to fund growth in large companies (Bodie *et al.*, 2010:7).

Due to the nature of equity investments, shareholders are collectively the *de facto* owners of a listed company and own the real assets of the company, including the company's buildings, vehicles and other assets (Bodie *et al.*, 2010:5; MacKenzie, 2006:38). Should a company perform satisfactorily, shareholders are entitled to dividends, which are their returns on the real assets that shareholders financed to generate the company's income (Bodie *et al.*, 2010:3). As a result, shares in a listed company are a claim against the listed company and an asset for individual shareholders and contrariwise for the listed company. For the company, shares are a liability since they require positive performance. When the balance sheets of the listed company are juxtaposed to the shareholders' balance sheets, the shares balance one another out (Bodie *et al.*, 2010:3). All that then remains on the balance sheets collectively are real assets owned by the company. However, balance sheets do not "measure the present economic worth of a business" (Banks, 1972:19). Ownership and the trading of shares, on the other hand, are facilitated by capital markets. In South Africa, this is undertaken by the Johannesburg Stock Exchange's Securities Exchange (Marx *et al.*, 2010:27).[21] The JSE was founded in 1887 but was not the first

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19 Within this context, 'real' refers to an accountancy distinction between assets and not a philosophical distinction.

20 The other prominent form of equity investments are bonds, where a company promises to pay a certain sum on a determined future date (MacKenzie, 2006:38).

21 Below, the Johannesburg Stock Exchange is referred to by its common acronym, 'JSE'.

formalised South African equity trading market. The first capital market in South Africa was the Kimberly Royal Stock Exchange, which was formed in 1880 (Lukasiewicz, 2017:719).

As explained above, there exist a mosaic of theories on how to value stock, and debates regarding stock price fluctuation only increase during periods of volatility (Chugh & Meador, 1984:41; West, 1988:58). Some more common approaches focus on dividend pay-outs as a primary factor in stock valuation, cash flows, or the valuation of stocks by comparison but this is far from "the end of the story" (Ross *et al.*, 2018:165,174). Admittedly, the evaluation of "the value of the assets or stock of a business enterprise will always be a challenging task", and recent stock market movements have highlighted this task and gave rise to this study (Banks, 1972:19).

Preda (2002) suggests that information has become crucial to the pricing of stock, and cases, where information is lacking, can have significant effects on shareholders. The quintessential example is the WorldCom accounting scandal, where company profits were overstated by approximately $3,8 billion through incorrectly classifying expenses as investments – leading to the largest United States bankruptcy outside of the Lehman Brothers scandal (Bodie *et al.*, 2010:9). Unfortunately, similar cases abound. Enron, for example, was required to restate earnings amounting to only 20% of the initially reported figures after incorrectly representing its debt (Sims *et al.*, 2014:246). The Freddie Mac scandal had "held or guaranteed subprime and Alt-A loans with an unpaid principal balance of $553 billion" (Wallison & Calomiris, 2009:78). Moreover, the Satyam scandal similarly had assets to the value of $1,47 billion wiped off of the company's balance sheet due to overstatement (Bhasin, 2015:32). More recently, the German Payments company Wirecard had its stock price of $117.26 per share plummet during June 2020 to $1,28 after $2,1 billion was "missing from its balance sheet" (Smith, 2020).

Yet there is not much need to go looking overseas as similar cases have come to the shore of South Africa. The most prominent thereof is arguably the Steinhoff saga, where shareholders saw a 90% crash in market value from December 2017 until March 2019 (Bloomberg, 2019). From Steinhoff's shareholder losses, several South African companies have recently followed. In March 2019, Tongaat-Hulett's share price plummeted by 43% (Cronje, 2019). During May 2019, Sasol Ltd. announced increases in its Lake Charles project costs leading to a decrease in Sasol Ltd.'s share price with 37%, and calls from the country's fifth and third-largest fund managers for the removal of Sasol's Chief Executive Officer (Mahlaka, 2019; Prinsloo & Sguazzin, 2019).

These examples further illustrate the need for greater investigation into stock price fluctuations and in the case of Wirecard, the company's poor Sustainable and Responsible Investment rating raised concerns for some market analysts before the stock price collapse (Smith, 2020). Wirecard illustrates that in different scenarios the "accounting book value per share is of limited use"

(Banks, 1972:27). Recent developments within the equity market sphere have poignantly stressed how disconnected the balance sheets of companies can be to share prices since no previous disease "has impacted the stock market as powerfully as the COVID-19 pandemic" (Baker *et al.*, 2020). In comparison to the accounting irregularities above, the initial impacts of the Coronavirus on the global equity market has eclipsed previous share losses and emphasised that market fluctuations are not only caused by accounting practices, modelling or comparative share value but can greatly be influenced by external, unaccounted and non-human entities. In this environment, markets are "sensitive to the number of COVID-19 infections" and "stock prices fall and bond yields increase if the growth rate of infections increases" (Klose & Tillmann, 2020:3). The consequent spread of the Coronavirus "created an unprecedented level of risk, causing investors to suffer significant loses in a very short period of time" (Zhang *et al.*, 2020).

For most of 2020, the global drive towards combating the virus was still ongoing and in combating its spread, significant strain continued to be put on governmental, medical, and social resources internationally (Porcheddu *et al.*, 2020:127). Even though the Coronavirus' impact on global markets is still developing, its initial influence has been immense and the International Monetary Fund projects a global recession which is "much worse than during the 2008-09 financial crisis" (IMF, 2020:1). This expectation is particularly relevant as 2019 projections considered the 2020 United States economy as "recession-proof" yet, Wall Street suffered "Another black Monday" due to the Coronavirus (Lewis, 2020; Potter, 2020; Valetkevitch, 2020). Following the Coronavirus, United States equity volatility levels were easily comparable to that of 2008, 1987 and the 1930s (Baker *et al.*, 2020:1). Since the 24th of February 2020, the news related to the Coronavirus had become "overwhelmingly the dominant driver of large daily U.S. stock market moves" (Baker *et al.*, 2020:1). Locally, the same impact was experienced in South Africa as the "JSE's all share index lose more than 12% of its value [and] many of South Africa's biggest companies lost billions in value" (Finance24, 2020). During South Africa's Lockdown period, Gross Domestic Product fell by 34 percent and a 40 percent decrease in wage earnings for low educated labour (Arndt *et al.* 2020:2). Clearly, the most vulnerable households are the most impacted and the initial shock has pushed significant numbers of households into food insecurity (Arndt *et al.* 2020:2).

The impact of the Coronavirus raises an obligation to recognise the virus' humanitarian impacts, but the virus' development also particularly draws attention to humanity and the connectedness of its economies to one another and the environment. In combination, the accounting examples and the initial impact of the Coronavirus have stressed the vagueness of our markets in valuing equities during periods of market turmoil specifically, but also restated this vagueness during periods of relative stability. The impact of the Coronavirus has therefore refocussed the role of

non-human entities in our markets and alongside the other examples, emphasises that a purely Neoclassical Economic approach towards our equity markets is insufficient. For this dissertation, the impact of the Coronavirus stresses that alternative approaches which recognise the role that our environment, and other non-human actors have on equity markets.

Accounting for the Coronavirus, or any other excluded entities, is not a novel concept in equity markets and the "process of internalising risks – such as extreme weather events, […] or climate change – can be seen as a commodification process of social and environmental events formally not considered relevant in the sphere of financial market" (Giamporcaro, 2011:121). One existing area within Finance which attempts to commodify such phenomena is the area of Sustainable and Responsible Investment (Giamporcaro, 2011:121).[22] Sustainable and Responsible Investment concentrates on the calculation and commodification of Environmental, Social and Governance factors. Consequently, Environmental, Social and Governance factors have become measures to make markets sustainable which have "grown in popularity especially over the past few years" in global markets and in South Africa (Bhana, 2018:124; Chan *et al.*, 2016:370; Giamporcaro, 2011:121; Sherwood & Pollard, 2019:15). Institutions and business schools have also followed this trend and focus grows within green business and the valuation of companies according to their Environmental, Social and Governance factor performance (Holger, 2019).

Principally, these approaches shifted the focus of firms from profit maximisation to "a desire to conform to a set of values that transcended personal economic gain" which developed within companies during the end of the 19th century and led to the establishment of Corporate Social Responsibility which would become common in the 1970s (Sherwood & Pollard, 2019:6–8). As with theories of value, the principles of Sustainable and Responsible Investing have been practised for centuries within Christian, Jewish, Muslim, and numerous other faiths (Sherwood & Pollard, 2019:6). The anthropology of markets, as proposed by Callon (1998), complements the consideration of Environmental, Social and Governance factors and, as Chapter Four explains, is strengthened by Actor-Network Theory (Giamporcaro, 2011:123).

The shift in focus of Sustainable and Responsible Investment is an important pivot away from the Neoclassical Economic School. In plotting a convergence in the Fourth Chapter, Latour's philosophy underwrites existing SRI methods which introduce Environmental, Social and Governance factors within stock valuation. However, when moving from theory to praxis, Latour's philosophy also uncovers that applying SRI remains insufficient in recognising the vast number of entities currently excluded from our accounting systems. Nonetheless, Environmental, Social

[22] Referred to as either Sustainable and Responsible Investment or by its acronym 'SRI' below.

and Governance factors may provide one approach towards decreasing this externalisation and is considered for this reason.

Latour's approach explains the inaccurate perspective of our accounting systems in recognising the impact of matters which we have externalised from our economies in the Third Chapter of this Dissertation. In Chapter Four, it becomes clear that Latour suggests a move towards recognising these factors and a greater recognition for the responsibility that individuals, companies, governments and pension fund boards have. However, to adequately situate this comparative, Latour's work needs to be developed and follows in Chapter Three.

2.7 Conclusion

Chapter Two set out to trace our understanding of value within the 'natural' development of our economic systems, from their Greco-Roman influences to the more recent, Neoclassical Economic School's conception. The Chapter was launched by considering the theory of justice in trade suggested by Aristotle and his distinction between value-in-use and value-in-exchange (Hengstmengel, 2019:113; Jaffe & Lusht, 2003:7; Sewall, 1901:2). It promptly became apparent that, unlike today, the works of Aristotle did not focus on pricing but rather situated trade in a social context, based on equity and interdependence (Aristotle, 2009:88; Polansky, 2012:165).

Subsequent development during the 11th century exchanged this social approach of the Greco-Romans for Feudalism and with it, the ownership of land by lords. In considering Latour, this dissertation proposes that Feudalism forms the basis for the disassociation of humanity with its environment, a subject which the following Chapter further develops in light of the work of Latour.

The increased welfare of Lords broadened the use of agricultural land and strained belief systems in Europe, requiring theologians to reconsider wealth. (Jaffe & Lusht, 2003:10; Sewall, 1901:549). In following the works of St Augustine, profits were re-characterised as the result of one's labour (Jaffe & Lusht, 2003:11). This variation allowed for the perception of equity in exchange to continue through objects of equal labour and expense and - as influenced by Aquinas - mould the labour theory of value (Kaulla, 1940:54).

Later, during the 16th century, the determinators of value shifted from labour and expenses to supply and demand. The belief that wealth consisted of precious metals also became commonplace, and the rise of the mercantilist system saw governments attempt to accumulate gold and silver as extensions of power (Haley, 1936:349; Sewall, 1901:587). Theories of value, however, did not follow the mercantilist approach and developed the theories of value-in-use and intrinsic value.

Smith ([1776]1976:558) would later also disagree with the mercantilist approach by recognising that, in equating price to value, gold and silver's value fluctuated based on the efforts required to unearth it. Smith proposes the classical economic model as an alternative to the Mercantilism, which continued until the 19th century (Seligman, 1971:2). Smith's economic model supports consumption "to satisfy wants" and as a means to increase individual happiness which it measures through Gross Domestic Product (Mohr, 2015:122).

Mill's utilitarianism provided measures for calculation and Jevons, Menger and Walras further developed the economic models underscoring the Neoclassical School to form the utility theory of value which continues today. Understood in this light, it is easy to conclude that the "axiology of classical utilitarianism is hedonic" as it focuses exclusively on the satisfaction of human needs (Callicott, 1984:300). Utility, in this light, is framed from a subjective perspective which Neoclassical Economics posits to apply exclusively to humans in maximising welfare through consumption (Goudzwaard, 1979:31). Value, according to the Neoclassical School then relates to the price of an object, as determined by the market (Bodie *et al.*, 2010:xv).

While this dissertation illustrated the challenge in characterising individuals according to the principles of *Homo Oeconomicus*, as utility maximising entities with perfect information sets, it was significantly less so when applied to asset managers. However, determining how asset managers considered value on the equity market, a myriad of approaches and models did not allow for an amalgamated approach either, exposing existing anxieties during periods of relative stability and emphasising them during volatile periods.

A possible approach towards addressing these concerns, dynamics and events in the market is through the work of Bruno Latour with a specific focus on Actor-Network Theory. Considering the impact of the Coronavirus on global markets, as an example, Latour's Actor-Network Theory is uniquely situated to level the playing field and consider necessary recalibrations to more effectively recognise the impacts of all entities on our equity markets. Latour's approach in the following Chapters moves towards greater recognition of the impacts of non-human entities and the simultaneous recognition of humanity's impacts on the globe, as emphasised by the Coronavirus. Latour's ability to recognise the impact of non-human actions on our economies is explained in the Third Chapter. It allows for an impetus towards understanding a way forward in considering our growing environmental crisis and its role in the ongoing debate in our re-evaluation of share value.

This will follow in the Fourth Chapter but to appreciate the Latourian perspective, we must first unpack it, and situate it within our economic environment. The Second Chapter of this research has undertaken this process partially by explicating the development of our economies from the

Greco-Roman foundations to the Neoclassical understanding of Economics as is prominent in today's economic subsections. The narrative created has delineated the Neoclassical Economic Model and provided for initial interactions with Latour. Chapter Three situates Latour within this environment and provides specific insights into his contributions and criticisms of our economic systems.

CHAPTER 3

VALUE TRANSFERRED: TRACING LATOUR'S ACTOR-NETWORK THEORY

3.1 Introduction

Actor-Network Theory has its roots in Science Studies, which was researched broadly during the 1970s and 1980s at the Centre de Sociologie de l'Innovation at the École des Mines de Paris by a group of researchers including Bruno Latour, Michel Callon, and John Law (Lezaun, 2017:307; Muniesa, 2015:80).[23] At the time, Science Studies examined the work of engineers and scientists empirically, focussing on the "often ethnographic or micro-sociological approximation" of their actions in areas of contention (Lezaun, 2017:307). Founded in French poststructuralism, Actor-Network Theory considered reality as constructed from a "laborious process of material articulation" rather than that of mainstream Social Sciences which emphasised beliefs, conventions, and social forces (Muniesa, 2015:80). These inquiries unpacked the fact-formation processes of scientists and engineers and collectively re-evaluated "the nature of scientific objectivity" (Lezaun, 2017:307). Latour (2017:90) highlights that science develops through the revision of the entities which collectively form the world – that which "philosophers normally and rightly call *metaphysics*". Yet, Latour's philosophy generally struggles to be classified in contemporary philosophical orientations (Harman, 2009:57).

Actor-Network Theory also developed in a wide variety of the Social Sciences, challenging mainstream social theory along the way (Lezaun, 2017:305). Within the market environment, Callon (1999) applies Actor-Network Theory and later, alongside Muniesa, refines the approach to "address empirically the calculative character of markets" (Callon & Muniesa, 2005:1229). Today, Porter (2013:337) suggests that Actor-Network Theory "provides unique theoretical insights into materiality, power, and science that are valuable for understanding global Finance and international affairs" which the Fourth Chapter of this research explores. The explication, however, of Latour's work in this Chapter contributes to our understanding of the equity markets and situates possible approaches in Chapter Four.

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[23] Although the foundations of Actor-Network Theory had been established in earlier pieces, the seminal works of Actor-Network Theory were published by Callon (1986, 1987) where it was titled the "sociology of translation", however, the prior terminology of the two proved more popular within the Anglophone academia (Muniesa, 2015:80, 2019:57).

Prominently, Actor-Network Theory has been described as a "ruthless application of *semiotics*" which generates the attributes of entities based on their interrelations. It casts aside the inherent qualities of entities, and essentialism as an effect (Law, 1999:3). For Latour (1993:3), Actor-Network Theory developed from the critique on the categorisation of 'the Moderns' and is essentially an argument against reductionism (Harman, 2009:12). Accordingly, this Chapter begins by exploring a deeper explication of the Moderns as briefly considered in Chapter Two. As Chapter Two had unpacked, Modernism contrasts that which was pre-modern for Latour (1993:10). Whereas pre-modernity reflects stability, the Moderns focus on growth, which they measure in comparison to that of pre-modernity as a baseline. This Chapter primarily focuses on unpacking Actor-Network Theory's fundamentals and characterising its application to the market after discussing the Moderns. For this application to develop, Actor-Network Theory is first delineated in two sections: firstly, as proposed by Latour in Section 3.3 of this Chapter and, secondly, in considering Latour's responses to some of Actor-Network Theory's critique in Section 3.4.

Following the critique, Actor-Network Theory's application to markets is unpacked in the penultimate section (3.5). In short, Actor-Network Theory recognises that an "economy of calculation is precisely an economy of movements" and can be used to trace these movements (Callon & Muniesa, 2005:1231). Therein, Callon (1999:182) explains how to apply Actor-Network Theory to the utility maximising asset managers considered in the Second Chapter. The ground is then set for Latour's ecological focus and Chapter Four then brings Latour into equity markets through Sustainable and Responsible Investing.

3.2 The Modern Constitution

In Chapter Two of this dissertation, the utility maximising asset managers characterised were concerned with investment performance, which they measure according to benchmarks. Generally, benchmarks are variable for asset managers, taking into account the fluctuation of inflation by way of a country's Consumer Price Index or an alternate parameter (cf. Arjaliès *et al.*, 2017:36).[24] The intention of a benchmark is to juxtapose an asset manager's performance in comparison to the market and investment reports, then reference the growth of a fund in comparison to its benchmark (Chan *et al.*, 2009:4553). This comparison allows investors to determine whether their investment had outperformed or underperformed in the market, according to the fund's returns. Unless the benchmark is a static percentage, it will understandably fluctuate with developments in the market. Should a country's inflation rate decrease due to a hike in the central bank's prime rate, then the CPI of the country would

[24] Below, the Consumer Price Index will be referred to in full or by its abbreviation 'CPI'.

decrease as well, bringing down the asset manager's CPI correlated benchmark (Fourie & Burger, 2010:69–96). However, as we have discovered in Chapter Two, the prime rate is by no means the sole influence of market movements. MacKenzie (2006:185), for example, notices how the New York Stock Exchange's Black Monday crash in 1987 saw how markets "internationally also fell, and in Britain, even nature seemed to echo the human turmoil".

As developed in Chapter Two, the Moderns mirror asset managers' benchmarks in applying what Latour (1993:1) calls the "Modern Constitution". The Moderns developed the Modern Constitution to assess humanity's progress and evaluate what progress had been made. The Moderns achieve this comparison by way of a juxtaposition. Utilising the Modern Constitution, the Moderns mandate the purification of the world's entities by the separation of "nature" from "culture" (Latour, 1993:11).[25]

Nature, according to the Modern Constitution, is considered mechanical, independent, and factual, a "mononaturalism" (Latour, 2004:29). Characterised as such, nature becomes static and unable to alter or influence culture. The mononaturalism the Moderns then contrast to a varying, inexact and relativistic prediction of human values, or "multiculturalism" (Latour, 2004:29). In sum, the Moderns characterise themselves from an anthropocentric foundation, based on the events and actions of individuals (Latour, 1993:13). The Moderns then measure up their progress to nature, which they characterise as invariable, unalterable, and factual (Latour, 1993:13).

The German jurist Kohler (1900:83) provides a clear explanation of the workings of the Modern Constitution when proposing that an invention is a manifestation of humanity's will to progress, furthering society's knowledge of nature. Essentially, by suggesting that discoveries in nature advance humanity's progress, Kohler facilitates a distinction where rigid, inalterable "matters of fact" form the measurement of development when compared to "matters of concern", the latter of which are opinion based and fluid (Latour, 2005:85, 2017:164).

Undoubtedly, it is a bold claim to assert that the Nature/Culture distinction is flawed, and an assortment of critique exists on Latour's claim.[26] However, an exhaustive inquiry into this critique is beyond the scope of this dissertation, which focuses on identifying how Actor-Network Theory can contribute towards our understanding of value within equity markets. Nonetheless, some of

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25 Latour also makes use of alternative terms to explain this distinction, but for this research, the concepts will be referred to as they are above (see for example Latour, 2004:38; 1993:41).

26 Walsham (1997) evaluates this distinction and will be discussed *infra*, however for a detailed critique of the difference see Collins and Yearley (1992:301-326), or Pollini (2013) as it relates to ecology specifically.

the most salient critiques will further contribute towards characterising Actor-Network Theory in Section 3.4 of this Chapter, including the subject/object distinction.

To distinguish entities by their divide, the Modern Constitution attempts to "purify" entities into either "nature" or "culture" (Latour, 1993:11). The process of purification allows the Modern Constitution to distinguish the Moderns from that which came before the Moderns and towards growth (Latour, 1993:3). The use of nature as a baseline, however, prevents the comparison of the Moderns to that which came before them and Latour (1993:11) labels this group the "premoderns". The premoderns are "archaic, attached and dependent" in the eyes of the Moderns, yet they were also concerned with the connections between nature and culture (Latour, 1993:11, 2011:76).[27]

By defining the benchmark as the state of nature, the premoderns are categorised exclusively into nature by the Moderns. The use of the premoderns as baseline consequently prevents the Moderns from recognising the connections identified by the premoderns as the two "simply could not appear as one single and coherent configuration" (Latour, 1993:41). This reasoning speaks to how the Moderns defined nature and culture and prevents the Moderns from relating themselves to the premoderns who wholly form part of nature for the Moderns (Latour, 1993:39).

While the Moderns trace growth through innovation (Latour, 1993:10), asset managers commonly trace increases in their portfolios in correlation to the Consumer Price Index. By using nature as a benchmark to determine progress, nature fulfils the same role as CPI for asset managers. However, the benchmarking style used by the Moderns differs from asset managers because nature is static and invariable, unlike CPI. The use of CPI provides asset managers with a flexible benchmark which alters as the market changes. The Moderns, on the other hand, make use of a baseline and not a benchmark in investment terminology by comparing growth to a fixed, unvaried nature. While a benchmark can fluctuate, like South Africa's CPI, which had growth fluctuate around 4,1% during 2019, a baseline remains static and has annualised growth of 0% (Stats SA, 2020). Accordingly, while investments can account for inflation and changes in their benchmark, the Moderns' baseline could not. This shortcoming became apparent in 1989 following the "proliferation of hybrids" and led to a crisis of the Moderns (Latour, 1993:8, 30).

Latour (2004:132) also identifies that this distinction is typically assumed in the Economic Sciences which groups entities within the Nature/Culture divide as "'producers,' 'consumers,' and 'goods'". However, despite the Modern Constitution's mandate, all entities do not adhere to the strict division required to determine progress. Latour (1993:30) calls these entities "hybrids" and

[27] This is an area which Latour (1993:11) believes has had significant anthropological attention.

considers hybrids to be “mixtures of nature and culture”. When an entity falls into one of the categories of the Modern Constitution but exhibits characteristics of the alternate, it qualifies as a hybrid (Latour, 1993:41). Latour (1993:2) introduces readers to hybrids by identifying how prevalent they are in contemporary news; he reads:

> “… on page ten, about a forest burning, its columns of smoke carrying off rare species that some naturalists would like to protect; on page eleven, […] there is a slag heap in northern France, a symbol of the exploitation of workers, that has just been classified as an ecological preserve because of the rare flora it has been fostering […] On page fourteen, the number of lines on high-definition television brings together Mr[sic] Delors, Thomson, the EEC, commissions on standardization, the Japanese again, and television film producers. Change the screen standard by a few lines, and billions of francs, millions of television sets, thousands of hours of film, hundreds of engineers and dozens of CEOs go down the drain”.

Each of Latour’s examples serves to illustrate the overlap of entities between the nature and culture divide and highlight the “proliferation of hybrids” which bring the Modern Constitution’s distinction into question (Latour, 1993:30).

While the Modern Constitution purports that culture unilaterally influences nature, considering how the burning of Brazil’s Amazon rainforest urged action from world leaders and caused political tensions in the process, the impact of nature on culture is clear (Andreoni, 2019). Similarly, years of mining operations around Johannesburg have increasingly placed pressure on public hospitals due to the locals’ slag heap inhalation, which would fall within the nature half of the dichotomy if purified by the Modern Constitution (Balch, 2015). Hurricane Sandy, which hit the United States coastline in 2012, also forms part of static mononaturalism for the Moderns despite leading to the realisation of “fewer gains from trade” by United States equity market traders (Rehse *et al.*, 2019:319).

Should the market later have “systemic financial crises” as, in 2008, traders would face increases in heart diseases, cancer, and illness as an effect (Crosthwaite, 2012:35). Possible sales tactics during such a crisis could focus on the increasingly “prominent role” of social media on influencing society, which has made it a key focus area for aggressive advertising (Hart *et al.*, 2013:45).

Undeniably, the examples above stress that the Modern Constitution cannot consider hybrid entities and illustrates the flaws in how the Moderns attempt to quantify entities. Because the quantification takes place from within the scope of the Modern Constitution, the Moderns fail to account for hybrids and leave significant areas unaccounted for in the process (Latour & Lépinay, 2009:134). As illustrated in Chapter Two, the most notable example of this dissertation is the Coronavirus and its impact on equity markets. The Covid-19 Pandemic has recharacterised markets as “embedded in societies and the natural environment” (Kell, 2020). For asset managers, “financial markets no longer exist in isolation to social or environmental challenges” and approaches to recognise the role of hybrids and nature within our economic systems are

increasingly popular therein (Howard, 2020). One approach, which the Fourth Chapter develops, is the use of Sustainable and Responsible Investment metrics to “quantify companies’ social and environmental externalities” (Howard, 2020).

In contrast, the Moderns interchange the two categories and attempt to overlook hybrids (Latour, 1993:37). This double-play, Latour (1993:37) contends, is defended by the Moderns’ categorisation. Should nature be situated within culture, the Moderns would hold that nature is only studied by Science which acts as an intermediary (Latour, 1993:37). At the same time, Latour (1993:37) claims that when situating culture within nature, the Moderns “will tell you that Society is transcendent and its laws infinitely surpass us. If you object that they are being duplicitous, they will show you that they never confuse the Laws of Nature with imprescriptible human freedom”. Contrariwise, Latour (1993:37) contends that there is no finite distinction between the two categories and that entities are concerned with both nature and culture - as the existence of hybrids has shown, and the impact of the Coronavirus on global markets has emphasised.

Individually, hybrids would customarily be addressed by the Moderns through two practices which Latour (1993:10) refers to as “translation” and “purification”. Translation identifies hybrids and purification situates them either entirely into nature, or culture (Latour, 1993:10–11). While undertaking both practices, the Moderns take no notice of the hybrids and uphold their Modern Constitution. Nonetheless, the progress of the Moderns has shown that the “more we forbid ourselves to conceive of hybrids, the more possible their interbreeding becomes” (Latour, 1993:12). Thus, the further proliferation of hybrids created by progress has generated the Modern Constitution’s crisis, and the revolution of the paradigm (Latour, 1993:12).

Latour (1993:8–11) posits that, in 1989, significant social and political factors highlighted the malfunctions in the Moderns’ distinction leading to its crisis. The Modern Constitution’s incapability to recognise that there can be an overlap between nature and culture was one of two inabilities that led to the Modern Constitution’s crisis (Latour, 1993:1). The other, ironically, was the Moderns’ drive to progress (Latour, 1993:11, 2005:119, 2011b:21). The continued urge to advance only led to the further accrual of entities unable to fit within the nature and culture divide, further emphasising their overlap (Latour, 1993:11, 2005:119, 2011b:21).

The reason why 1989 is unique, according to Latour (1993:8–10), is for its dual apprehension of the Modern Constitution’s limitations in politics and ecology, bringing into question whether humanity is antimodernist, modern or postmodern. Notably, Latour is also not alone in identifying 1989 as a year of crisis. Explicitly in Finance, King (2016:25) holds that the fall of the Berlin Wall was “not just the end of communism but the beginning of the biggest crisis in Capitalism since the Great Depression”. In South Africa during 1989, the final racially distinguished elections also

hinted towards the end of the country's mandated racial oppression (see Taylor, 1990). The appointment of F.W. De Klerk as President and the more cooperative leadership of the ruling party encouraged "movement towards establishing negotiations with serious black leaders" in ending the Apartheid regime (Taylor, 1990:164).

The simultaneous fall of the Berlin Wall and the convening of the first conferences on the "global state of the planet" explain Latour's (1993:8) point poignantly. While the fall of the Berlin Wall intended to announce the end of oppression, it brought not only the self-oppression of humanity into focus but the tyranny of nature as well (Latour, 1993:8). In the eyes of Latour (1993:9), this is a double tragedy since only developed nations could outsource ecological damage to developing economies. Developing economies then attempt to manifest growth by "imitating the West" which itself "believes it has lessons for others even as it leaves the Earth and its people to die" (Latour, 1993:9).

Bound by these circumstances, the Modern Constitution can only characterise the solution of the crisis following one of two options: either the Moderns could end the oppression of humanity over itself or end humanity's abuse of nature. Following the process of purification, the Modern Constitution weighs either of the two areas of the Nature/Culture divide as more critical. Latour (cited by Todd, 2020) recognises this divide on a macro-level but also illustrates it within individual worldviews, illustrating how they influence others. A key example of this can be seen when considering the divergence in the approaches of Donald Trump, the 45th President of the United States of America, and the teenage Swedish environmental activist, Greta Thunberg. Latour (cited by Todd, 2020) puts forward that Donald Trump and Greta Thunberg "inhabit different planets – Trump's is without limits, and Greta's is trembling and terribly finite".

In the following section (3.3), it will become clear that Latour (1993:9) suggests Actor-Network Theory balances the scale that the Modern Constitution fails to weigh. It will also become apparent therein that the Modern Constitution persists following its 'crisis' and in following the Modern Constitution's logic, recognising environmental impacts are "an attack on humanity's inviolable right to modernize itself" (Latour, 2017:26).

Interestingly, the crisis of hybrids identified by Latour (1993:49–90) adheres to the characterisation of revolutions in scientific paradigms by Kuhn (1963:366). However, Kuhn's theory itself is based in the Modern Constitution as it fails to recognise the interconnections between science and that which it studies (see Epstein, 2008). Classifying the Modern Constitution as an established paradigm in Science by Kuhn, the Modern Constitution's inability to identify anomalies in its model leads to its progressive rejection of those anomalies, bringing the paradigm back into question (Latour, 1993:9–10). Because the Modern Constitution is no

longer undisputed, alternative paradigms are proposed to that of the existing paradigm, followed by a revolution and the concluding re-establishment of a mature science (Kuhn, 1963:366). Conversely, Latour (1993:53,89) rejects the Modern Constitution, which allows him to develop an alternative to the processes of translation and purification.

Two significant consequences come to the fore when rejecting the Modern Constitution. Logically, it removes the requirements of identification and purification, but it also impacts on the Moderns' perspective of time. Because the Moderns' grand narrative of progress does not persist, time is not bound by this narrative either.

The Modern Constitution innately framed time linearly by basing it on progress (Latour, 1993:10, 2011b:21). Symptomatically, the passing of time was one-directional, "the past was the confusion of things and men; the future is what will no longer confuse them" (Latour, 1993:71). The Modern Constitution framed time as the assemblage of progress and, returning back to the German jurist Kohler example above, Kohler would see development as the furthering of humanity's knowledge of nature (cf. Kohler, 1990). In contemporary philosophy, this characterisation is similar to a grand narrative or meta-narrative for Francois Lyotard (1993).

The Modern Constitution would contend that the further advancement of Science would decrease the mosaic of opinions by the "unified certainty of the facts of nature", but the practice has proved this false (Latour, 2004:130). Latour (1993:74) recognises this phenomenon arising from "purified" hybrids of culture since:

> "no one knows any longer whether the reintroduction of the bear in the Pyrenees, kolk houses, aerosols, the Green Revolution, […] are outmoded, up to date, futuristic, atemporal, non-existent, or permanent".

Concurrently, this phenomenon also emanates from purified nature hybrids since human bodies have a combination of genes and habits which "range in age from a few days to several thousand years" (Latour, 1993:75). In the cases of bears or genes, what Latour (2011a:76) emphasises is that progress is relational and does not necessarily imply enhancement or development. When Latour (1993:75) situates this to time, we find that it "is this exchange that defines us, not the calendar that the Moderns had constructed for us". From the perspective of the Moderns, by rejecting the Modern Constitution time becomes "reversible" as unique perspectives can apply to different settings (Latour, 1993:73). This realisation does not do away with the role of innovation but disregards the linearity thereof and shifts the grand narrative of progress which formed the Moderns' perspective (Latour, 1993:48).

Latour (2017:191) considers the Moderns' approach when investigating their lack of reaction to matters of ecological concern. In sum, the linear approach legislated by the Modern Constitution

creates an “entrenched certainty” in the Moderns’ approach to progress (Latour, 2017:207). Concurrently, the distinction between nature and culture disassociates the Moderns from nature and prevents its recognition (Latour, 2017:207). Nature, characterised as static and unchanging, proves insufficient to fit within the Moderns’ conceptualisation of progress, mandating its disassociation and the disregard of materiality (Latour, 2017:211).

Latour’s (2017:212) solution, as a “return to (or respect for) ‘nature’” is developed in the Fourth Chapter and situated to determine possible measures of returning to nature within the equity environment. However, to appreciate this approach, the rejection of the Modern Constitution is necessary. In disregarding the processes of identification and purification, the Nature/Culture distinction can be omitted and the accrual of hybrids can finally be accounted for (Latour, 1993:40). Actants, now known, can be recognised for their roles in both of the areas of the divide, an impossible accomplishment when following the Modern Constitution. Latour develops Actor-Network Theory from this foundation and is unpacked in Section 3.3.

This section explained how the Modern Constitution mandated the categorisation and purification of entities. Following the Modern Constitution, it becomes clear that the division of entities into either nature or culture is flawed since the distinction cannot recognise hybrid entities. As a consequence of failing to be classified entirely in terms of the Nature/Culture binary, hybrid entities lack recognition in the Modern Constitution which led to a crisis for the Moderns. The previous examples of the fall of the Berlin Wall and the rise of climate conferences in 1989 intensified the Modern Constitution’s state of affairs. Despite the crisis, the proliferation of hybrids continued as the inability of the Modern Constitution to purify entities furthered the Nature/Culture distinction.

Latour rejects the Modern Constitution, disregards the Nature/Culture binary, and offers Actor-Network Theory to recognise the hybrid entities, which is the focus of the following section (3.3). Criticism which may apply to Actor-Network Theory when considering equity markets is broadly considered in Section 3.4 and Section 3.5 considers an Actor-Network Theory approach to the market.

3.3 The underpinnings of Actor-Network Theory

To launch an Actor-Network Theory account, firstly “an abandonment of the artificial divide between social and technical ‘dimensions’” needs to take place (Latour, 2005:87). The previous section (3.2) undertook this abandonment by recognising the flawed distinction of the Modern Constitution. As an effect of the Modern Constitution, the Moderns fail to recognise the associations between entities across the Nature/Culture binary because their Constitution characterises culture as unilaterally influencing nature.

In its place, Actor-Network Theory identifies these associations which fail to fall squarely in the area that the Moderns arbitrarily define as the 'social' (Latour, 2005:109). The distinction between "unity and objectivity on one side, multiplicity and symbolic reality on the other", does therefore not persist in Actor-Network Theory, allowing the associations between entities to rebound between the two categories (Latour, 2005:117). Acknowledging entities without this restriction allows for the recognition of all the associations between them. In terms of the previous examples, the impact of hurricanes and the Coronavirus on stock markets, financial crises, heart disease, and the cost of mining on community health can each be recognised.

Essentially, Actor-Network Theory has two functionaries: *actors* and *networks*. Actors 'mediate' interactions with other actors, the associations of which networks then plot (Latour, 1993:11). However, actors do not merely relay exchanges (Latour, 2005:39). Actors "modify the meaning of the elements they are supposed to carry" in their actions (Latour, 2005:39). Thus, only by performing mediation would an entity qualify as an actor in a specific network (Latour, 2005:39). Actor-Network Theory requires that an actor alters a force when mediating other entities that it is associated with (Latour, 2005:107, 2017:56). An entity qualifies as an actor should it be able to "provide the account of its action" amongst the associated entities which renders the action traceable (Latour, 2005:53). An Actor-Network account therefore traces links between associated actors. Still, this does not imply the mere transferral of an action by the previous actor.

The broad prerequisite used to recognise an entity in Actor-Network Theory allows for numerous entities to qualify as an 'actor'. In the instance that "*non-human, non-individual"* entities modify an interaction, the entity is referred to as an actant (Latour, 1996a:369). In contrast, human entities are referred to as actors, retaining the human/non-human divide (Latour, 1996a:369). However, it will become apparent in what follows that it is unnecessary to distinguish between actors and actants in terms of Actor-Network Theory. Consequently, 'actor' will imply the alternate 'actant' and the inverse within this dissertation unless an example explicitly requires otherwise. Distinguishing between the two will have as much bearing as distinguishing between nature and culture following the Moderns (Latour, 2017:58). Nonetheless, in no sense does this reference imply the symmetry of humans and non-humans (Latour, 2005:76). Actor-Network Theory is merely equating entities to recognise associations traced by the network in full (Latour, 2005:76).

Although the prerequisite for the recognition of an actor or an actant is broad, it is obligatory. If an entity "transports meaning or force without transformation" it will merely not qualify as an actant (Latour, 2005:39). These entities are termed 'intermediaries' by Latour (2005:37), who maintains that intermediaries have been the primary foci of numerous sociological theories. Inversely to other approaches, intermediaries have an insignificant role in Actor-Network Theory as they do not alter the tracing of a network and serve only as a relay between different actors.

Because intermediaries do not mediate actions in their transferral, the force that intermediaries transport remains intact. This contrast of actors to intermediaries alludes to the focus of Actor-Network Theory. Actor-Network Theory is concerned with tracing the actions of actants, not the acts *in esse*, or the transferral work of intermediaries (Latour, 2005:39). By following actions, Actor-Network Theory shapes a traceable network of associations between actors (Latour, 1996a:373). Consequently, Actor-Network Theory is not creating associations or pre-empting connections between actors; it uncovers existing associations by tracing the mediation of actions by actors.

To benefit this tracing process, Actor-Network Theory makes use of purportedly "meaningless" terms: 'network' and 'actor'; Latour (2005:29–30) proposes the use of simple words like 'actor' since they are non-prescriptive which allows for 'networks' to be shaped as they come to the fore. 'Actors' have no anticipated qualities and can only be described after tracing a particular network, contrary to what is common in social theories (Latour, 2005:30). This approach also prohibits Actor-Network Theory accounts to follow from an anthropocentric foundation and alongside it, the Nature/Culture split (Lezaun, 2017:311).

What distinguishes the tracing of an Actor-Network Theory account is the fact that the methods and models of the person tracing the network do not describe the actors within a network. On the contrary, the 'tracer' is unaware of the actions of the actors until tracing the network. Admittedly, the simple words used cannot comprehensively describe the mosaic of actions an actor may take. However, their use simultaneously delimits the ability for actors "to build their own space" due to the vast applicability of the words in comparison to more specified phrases would be more confining (Latour, 1999a:20).

The broad prerequisite to qualify within the generic term 'actor' allows for the extensive recognition of entities within a network. It correspondingly requires a different approach to that of theories that attempt to recognise intermediaries (Latour, 2005:107). Actor-Network Theory describes events after the fact and therefore is a 'negative' theory in the sense that it does not impose a hypothesis (Latour, 2005:42). Instead, Actor-Network Theory suggests "to follow the actors themselves" and in so doing Actor-Network Theory can recognise all actors within a network (Latour, 2005:12). Following actors concentrates the theory on interpreting networks rather than transforming them. This does not imply that Actor-Network Theory does not recognise how actions can multiply across other actors (Latour, 2005:45).

The infamous Black Monday crash, for example, can illustrate the difference in approach. On 19 October 1987 the Standard and Poor 500 index dropped by approximately 20 percent, exacerbated by unreliable information, unintended automated trading system algorithms, and

limited market liquidity (Carlson, 2007:2). Noting occurrences where a stock exchange could in one brief moment have 10 million shareholders sell their stocks in a particular shareholding simultaneously, Latour (2005:44) posits that most sociological theories would suggest that an invisible force had persuaded shareholders. Actor-Network Theory, on the other hand, would require the tracing of each of the individual actants forming the network consisting of both traders and algorithms, and not recognising any social forces but the impacts of individual actions on the network. Admittedly, tracing such a network is a herculean task, but it will become apparent in what follows that shortened and more straightforward accounts can also develop.

Actor-Network Theory is a subversion of other sociological theories and it attempts to explain the social rather than using the social as a method of explanation (Latour, 2005:108). Actor-Network Theory is also very cautious of suggesting what causes actants to act, as doing so would be imposing an invisible force on actants as well (Latour, 2005:47). Because Actor-Network Theory only follows the actions of actors, one of the most significant differences between Actor-Network Theory and other sociological theories is that it does not recognise any "hidden social force" (Latour, 2005:11). Actor-Network Theory does not dictate a specific "social context" constructed by other social theories either (Latour, 2005:41). In comparison, Actor-Network Theory has an inverted approach because it does not attempt to quantify nor explain society collectively; it brings essential social connections to the fore (Latour, 2005:34). Actor-Network Theory's incapability to create groupings and distil a vital social force allows for the recognition of all entities within a social network without the disturbance of continually altered groupings (Latour, 2005:35). Although unable to recognise groupings, Actor-Network Theory is not oblivious to the unequal distribution of social resources among groups (Latour, 2005:65).

An Actor-Network Theory account can form the first step in plotting inequalities by mapping a network. Actor-Network Theory cannot measure the distribution of social resources, but an Actor-Network Theory account can plot its inequalities (Latour, 2005:65). For Actor-Network Theory, the word 'social' is also not a physical entity but the temporary link between actors (Latour, 2005:67). Actor-Network Theory does not recognise social structures or laws, and for each action, the connection between actors needs to be traced (Latour, 2005:67). What is social, is constituted out of "a movement, a displacement, a transformation, a translation, an enrolment" (Latour, 2005:64). The 'social' is the brief link created between entities that map actors (Latour, 2005:65).

Actor-Network Theory requires the tracing of networks to take place *post facto* because it does not recognise social forces (Latour, 2005:45). Latour (2005:30–32) argues that most social theories attempting to generate unique groupings fail to recognise the dynamism of the group-forming process and how easily groups can be broken up or re-established. Additionally, grouping naturally isolates entities that do not form part of the group, given the fact that groups can are

formed and unformed continually, the classification of a group requires continual redefinition (Latour, 2005:30–32). Identifying actors individually also recontextualises the local/global distinction, which Actor-Network Theory "flattened" (Latour, 2005:203).

Actor-Network Theory's empirical foundation counts for the recognition of entities as well, as it requires the tracing of the actions of actors, because what qualifies as an actor is not determined by categorisation but by action (Latour, 2005:49). For associations to be recognised, Actor-Network Theory requires that mediation takes place. The alteration and transferal of an action to another actor through mediation traces the associations and plots by a network. As this suggests, only actants which form part of the associations traced by a network following a specific occurrence, form part of an Actor-Network Theory account. Tracing the network a second time would not necessarily have the same associations as the first account form part of the second (Latour, 2005:108). For each account "there is nothing but networks, there is nothing in between them" as only the actors who form part of a specific account are recognised (Latour, 1996a:370).

Preference is also not provided to any specific entity within a network; equalising entities allows for the recognition of all the possible entities which could have an impact on the network. This equity among entities also provides the opportunity for all actants' influences on other actants to be recognised. Preference among actors would limit the recognition of entities which can freely trace a network of associations (Latour, 2005:11). Actor-Network Theory also does not distinguish networks based on scale and does not provide any privilege to a 'local' or 'global' network (Latour, 1996a:371). By tracing the actions of actors, Actor-Network Theory recognises the connections between the global and local based on how the act shapes a network.

In brief, Actor-Network Theory disregards the object/subject distinction and traces the relations between equalised actors and actants *inter partes*. Collectively, this process forms a network which can vary based on the individual Actor-Network Theory account. The tool used to discover these associations is the network, which the remainder of this section develops in more detail.

Recognising that grouping requires continual care illustrates that a network does not derive its strength from its concentration or uniformity in Actor-Network Theory but from the number of entities it encapsulates (Latour, 1996a:370). A strong network forms from "dissemination, heterogeneity, and the careful plaiting of weak ties" (Latour, 1996a:370). Given the delicate nature of groupings, Latour questions how social links could become durable, as in the case of human interactions.

One example is the discovery made by Strum and Latour (1987), while researching the interactions of baboons. Strum and Latour (1987) recognise that baboons have no fixed social

structure; a baboon social structure needs to be continually re-negotiated. The instability in the social structure styles baboon behaviour as "geared to testing, negotiating and monitoring" individual positions within the social assembly with the other primates in the group (Strum & Latour, 1987:788). The critical difference between a baboon and a human social structure, Strum and Latour (1987:788) argue, is that the baboon society lacks objects, preventing it from establishing a stable social structure. When applied to a human context, the role of objects in social structures requires re-evaluation as, through objects, humanity does not need to continually negotiate its social structure (Strum & Latour, 1987:788). Instead, humans acknowledge the impact of objects on the mediation of a social structure, presenting it with a form of stability (Strum & Latour, 1987:788).

This approach proposed by Strum and Latour (1987) allows for the recognition of a vast array of previously excluded actants from the social structure of humans (Latour, 2005:69). Considering the approach also has an essential impact on the agency of entities, Latour (2005:52) identifies that the potential influences of an action are legion but that the fundamental requirements to trace an action within a network remain the same. Accordingly, there are two qualifiers for agency: firstly Latour (2005:53) holds that agency can only take place through an alteration of the *status quo,* there without, no observable mediation can be recognised; secondly, the entity providing this agency also needs to exist, unlike a social force (Latour, 2005:55). Before it takes place, the agency of action is unknown. "Which agencies are invoked" can then only be traced after the action occurs (Latour, 2005:62). Because Actor-Network Theory is not as concerned with agency as exclusively intentional, it becomes clearer "how a hammer, a basket, [….] a list or a tag could act" in stabilising human society (Latour, 2005:71).

Briefly considering the alternate in comparison, reducing agency to only intentional human action would isolate actions based on interests and disregard the scope which Actor-Network Theory affords (Preda, 2006:755). Additionally, complications of "conceptual regress and circularity" would need to be navigated in such an approach (Preda, 2006:755). By widening the scope to any entity which modifies an action, the recognition of agency follows suit (Latour, 2005:71). Unsurprisingly so, as one cannot:

> "maintain that hitting a nail with and without a hammer, boiling water with and without a kettle, fetching provisions with or without a basket, […] keeping track of your inventory with or without a list, running a company with or without bookkeeping, are exactly the same activities" (Latour, 2005:71).[28]

[28] Latour illustrates this point from a number of his works, including a door closer and a seatbelt (Latour, 1992) to a range of objects which help two friends meet in Paris (Latour, 1996b).

Simultaneously, this does not imply that the hammer has the intention to hit the nail, or that the basket realises the fetching of provisions, but instead that the impact of the actions can vary as acts have “many metaphysical shades between full causality and sheer inexistence” (Latour, 2005:72).

Within the stock market, Preda (2006:755) explains this occurrence by using the development of the stock ticker as an example. Before its introduction into stock markets during the 1870s, brokers almost exclusively made use of letters to place orders, which simultaneously distributed market information but also impacted client relationships (Preda, 2006:759). Letters endowed brokers with the ability to be “nodes in a network in which knowledge, deals and private services overlapped” as the use of letters situated an uncorrelated price within the specific setting created by the letter (Preda, 2006:760). The introduction of the stock ticker made price information more accessible and current; it allowed for the correlation of prices, and it made projections of continued increases and decreases in prices possible (Preda, 2006:760). The stock ticker provided a new basis for financial market decisions.

Additionally, the increase in the availability of prices made the plotting thereof possible, and by plotting changes, traders could monitor the market (Preda, 2006:770). The innovative use of stock tickers, therefore, extended the cognitive ability of traders to understand the market, unlike before its introduction (Preda, 2006:770). Although the function of the stock market has never changed, it requires drastically different activities from brokers in 2020 than in 1870. The stock ticker, which does not ‘will’ the buying and selling of equity shares on the market have agency in the market.

Similar to the shades of agency of a hammer or a basket, Actor-Network Theory may also not recognise an entity as an actant in every network. In one instance an entity may qualify as an actant, and in another, it may only be an intermediary. Latour (2005:39) recognises that the difference between the two can be subtle. Different settings can have “objects flip-flop their mode of existence”, and each Actor-Network Theory inquiry requires a rediscovery thereof (Latour, 2005:81). An electronic trading system functions as an intermediary when it accurately displays a fund’s returns to its financial year-end. Should the automated trading system suffer a glitch, it would “turn into a horrendously complex mediator” (Latour, 2005:39). Knight Capital experienced this phenomenon first hand on 1 August 2012, when a trading system malfunction cost the company $440 million (Massoudi, 2012; Philips, 2012).

What this example makes clear is that nothing exists *prima facie* in Actor-Network Theory, all entities need to be proven to exist by way of accounting for their actions (Latour, 2005:36). Because of this approach, no two inquiries would be the same as the individual links of each of the actions can trace associations by mapping out networks (Latour, 2005:36). For the time being,

it is relevant to note that Latour (2005:9) does recognise the vast scope of entities that may need identification in any Actor-Network Theory account. Fortunately, each line of the Knight Capital trading algorithm code does not need scrutiny because interactions which have fixed outcomes do not need to be acknowledged. Latour (1987:131) collects these actants and puts them all in a "black box".

A black box is a network of actants that collectively produce a determined outcome (Latour, 1987:131). Latour (1987:2–3) borrows the definition from cybernetics which would commonly "draw a little box" to represent a complicated mechanism or system which had a predefined outcome. As the outcome of the black box is determined, it does not require detailed elaboration. Within Actor-Network Theory, a black box allows an inquiry to focus on the relations which are not defined rather than focussing on the predefined outcomes within the black box. Intermediaries also constitute black boxes as they collectively account for one transferral of an action (Latour, 2005:39). In contrast to tracing a network, the result of any input into a black box can be acknowledged *a priori* because it has a specific, known outcome. The Knight Capital electronic trading system before the system malfunction is an example of a black box. On malfunctioning however, the Knight Capital trading system failed to fit in a black box since its outcomes were no longer certain, which the traders of the day undoubtedly realised.

Apart from black boxes, Actor-Network Theory does not attempt to recognise any other entities which do not fall within the definition of an actant when tracing a network. As such, Actor-Network Theory qualifies as a reductionist theory but, Latour (1996a:370) puts forward that this is a necessary step to develop a relationist, irreductionalist ontology. An initial recognition provides Actor-Network Theory with an empirical underpinning which resists further reductionism by requiring all entities and their actions to be examined (Latour, 1988:156, 2004:38). This initial step, therefore, abates further reductionism since as it prevents the new negation of vast arrays of actants into various groupings, and it ensures equity between actants in networks (Latour, 1988:123).

In summary, an Actor-Network Theory account follows a trail of mediators which make themselves identifiable through their actions (Latour, 2005:128). Each action transforms the action of the prior actor and renders the associations of the mediators visible, collectively tracing a network (Latour, 2005:128). It is the associations between actants which is described in an Actor-Network Theory account and not the network (Latour, 2005:131). The network is merely the tool that describes these traceable associations. A network is the recognition of an association between actants; it excludes entities that are not part of the specific association, and it does not maintain itself (Latour, 2005:132). Every act requires that the associations which it creates be traced (Latour, 1988:162). Each action is unique and cannot be related to actions in previous networks (Latour,

1988:162). Inherently, this implies that the durability of an association is void as no association can account for an action which another network had traced.

Although these actions are not durable, Latour argues that actions can be used to trace the relations of entities which give their account. Harman (2014:60), on the other hand, argues that objects cannot provide accounts for their actions and that the accounts can only take place through mediators, limiting the ascription of actions to humans. The following section (3.4) discusses this criticism and other salient critiques of Actor-Network Theory as far as they relate to the application of Actor-Network Theory for our present purposes. The subsequent section then unpacks Actor-Network Theory as applied to markets, allowing for Latour's understanding of value to initiate Chapter Four.

Following the rejection of the Modern Constitution in the previous section (3.2), this section unpacks the Actor-Network Theory according to each of the Theory's components. First, an 'actor' is defined by its ability to "provide the account of its action" and thereby create traceable associations (Latour, 2005:53). It became apparent that actors are not limited to humans as the broad criteria to qualify extended to objects as well (Latour, 1996a:369). Second, this section characterises networks, which plot the associations between the actors and actants through mediation. Third, this section unpacks the agency of actants, and a definition of black boxes then concludes the section. The following section (3.4) considers the critique of Actor-Network Theory which further develops the theory by its distinctions.

3.4 Outlining Actor-Network Theory through some of its critiques

Actor-Network Theory has been subject to many evaluations and criticisms from a wide range of disciplines.[29] However, in considering the critique of Actor-Network Theory, Latour (1999a) identifies four concerns that follow from its misinterpretation namely the 'actor', the 'network', the 'theory', and the hyphen '-'. These four concerns generally follow from assumptions of other social theories and will be dealt with first to clear the air of initial misconceptions regarding Actor-Network Theory. After that, four focal areas of critique in Actor-Network Theory, as summarised by Walsham (1997), are discussed as each area further characterises Actor-Network Theory and provides added depth to the analysis provided in the previous section (3.3). This section further develops Actor-Network Theory to initiate an Actor-Network Theory approach to markets in the subsequent section (3.5).

[29] See for example Doolin and Lowe (2002), Hanseth *et al.* (2004), Hornborg (2014), or Winner (1980, 1993).

One essential critique for this dissertation is the accusation of amorality of Actor-Network Theory by Winner (1980, 1993), which can introduce the critique of Actor-Network Theory when applied to markets. In sum, Winner proposes that Actor-Network Theory is unable to evaluate established but unethical, social practices as Actor-Network Theory can merely trace established networks and not provide insight into the exclusionary actors which overly influence the networks traced (Winner, 1980). Winner's critique is comparable to Walsham's, but their combination emphasises that Actor-Network Theory has faced criticism from both sides as either not being broad enough or too broad. The final portion of this section develops the solution proposed by Latour to Winner's review and its impact on our present study. However, the commentary by Latour provided directly below only illustrates the nature of Actor-Network Theory in so far as it relates to this dissertation's understanding of value in equity markets. Importantly, this section is not intended to be an exhaustive account of the criticism of Actor-Network Theory as it aims only to recognise concerns which are relevant to this dissertation. After the most salient concerns are identified, they are addressed and accommodated within the following Chapters.

At the outset, Latour (1999a:15) clears the air of misinterpretation by identifying four concerns regarding Actor-Network Theory. The first concern is the 'network'.[30] For Latour, networks designate the transformation and alteration of an action to an unknown set of actors. This hidden element requires the tracing of networks *post facto*, as described in the previous section (3.3). In the ordinary use of the term, networks can be a grid or fixed string of stations and radio towers that transmit telephone calls or carry coal – telephone or train 'networks'. The common understanding of a network is not the same for Latour's Actor-Network Theory, rather than transferring information, a network traces alteration. Instead of a telephone line, an Actor-Network Theory network resembles the children's game of 'telephone' where information is not transferred but reinterpreted, translated and transmuted and each successive rehearsal changes the initial message from child to child.

The second concern raised by Latour (1999a:16) is the hyphen as it relates to the 'Actor-Network'. Latour (1999a:16) submits that the hyphen has created significant misunderstandings of the theory, which critics interpreted as alluding to the well-known "agency/structure cliché" in the Social Sciences. Consequently, considerable critique focuses on the alternation of either the 'actor' or of the 'network' pole which Latour (1999a:17) himself raised during the development of the theory. Latour (1999a:17) contends that the initial intention of Actor-Network Theory was not to situate it within the 'agency/structure' debate and that it is preferably concerned with the movement of actions through various actors. Networks do not constitute society; neither do actors

[30] The first critique that Latour addresses is put forward by Law (1999).

represent the sum of society. To this effect, neither the actor nor the network weighs more heavily in considering the 'actor-network' as a dichotomy. Actor-Network Theory merely follows singular actions between entities, and because the network only traces actions, it cannot determine how entities 'should' act (Latour, 1999a:18).

Latour's second concern introduces the third namely 'theory'. Latour (1999a:19) holds that Actor-Network Theory does not attempt to determine what constitutes "the social".[31] As Actor-Network Theory does not attempt to define entities, it also does not try to determine what 'the social' is. It does not impose a structure for the network to take; on the contrary, it allows for the formation of networks, which it then traces (Latour, 1999a:19). The tracing of the networks, in turn, uncovers the nature of actors, but this does not take place through pre-emptively defining them (Latour, 1999a:20).

The fourth and final concern raised by Latour (1999a:21) is the 'actor'.[32] This concern also follows from the second as it relates to the dichotomisation of 'actor-network'. Latour (1999a:21) notes that Actor-Network Theory fails to be situated neatly within one field of research by dealing with agencies across the Nature/Culture divide. Still, this inability plays to the advantage of Actor-Network Theory as it allows for the recognition of various "points of contact, as many correspondences" as can be traced and as an effect, Actor-Network Theory subverts many of the problematic dichotomies organising individual fields of research (Latour, 1999a:22, 1999b:80–112).

Latour identifies a challenge in the Modern Constitution, which directs, for example, politics to be allocated wholly within the field of 'culture' and science entirely within 'nature'. Actor-Network Theory, on the other hand, disregards this distinction and allows for the recognition of entities from both sides of the arbitrary divide (Latour, 1999b:86). Science, for Actor-Network Theory, is not "disconnected from the rest of society" but also is not a product of the "'social construction' of reality" (Latour, 1999b:84). Actor-Network Theory does not attempt to characterise science in the first place; it disregards the Modern Constitution's classifications by recognising the network of entities included across the Nature/Culture divide (Latour, 1999b:85). This point is developed further in the following section (3.5), which considers the Economic Sciences' interpretation of the Nature/Culture divide in light of Actor-Network Theory.

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31 Latour (1999a:19) cites the third concern as initially being raised by Mike Lynch who suggests that "actant-rhizome ontology" as a more appropriate name for Actor-Network Theory.

32 The final concern raised by Latour (1999a:21) is proposed by Collins and Yearley (1992:301-326), and later by Bloor (1999).

Collectively, the ‘network’, the hyphen ‘-’, the ‘actor’, and the ‘theory’ constitute all four of Latour’s concerns flowing from the misinterpretation of Actor-Network Theory. However, critique on Actor-Network Theory is not limited to misconceptions. Walsham (1997) recognises four main paths of critique which this section will consider as it further unpacks Actor-Network Theory.

Firstly, Walsham (1997:472) notes that a significant path of critique is that Actor-Network Theory does not recognise influences of the broader social structures on the actions of actors. Because Actor-Network Theory only traces networks, Walsham (1997:473) argues that it concentrates on the local sphere of actors and networks while failing to recognise the different impact that global structures can have on actors. Ultimately, Walsham (1997:472) argues that this limits Actor-Network Theory from perceiving all of the actants within a network. Latour (1993:118, 2005:29) however, explains that Actor-Network Theory requires no distinction between the two structures at all. A broader understanding of the entities forms when tracing a more extensive network. As developed considerably in the previous section (3.3), the scale of any network is irrelevant for Actor-Network Theory which characterises all networks according to the same qualities, regardless of size.

However, Latour’s response is not satisfactory for Walsham (1997:473), who suggests that Actor-Network Theory and theories which consider broader social structures collectively characterise networks. Later, Latour (2005:104) makes it explicit that networks in Actor-Network Theory do not recognise social structures in forming part of an Actor-Network Theory account as the baboon example above illustrates and doing so would limit the opportunity for Actor-Network Theory to recognise actants within networks. The approach suggested by Walsham would thus run contrary to the nature of Actor-Network Theory, which mandates overall equity between entities. Nonetheless, this first criticism by Walsham can entrench the initial requirements for an Actor-Network Theory inquiry discussed in the previous section (3.3). Incomparable to other social theories, Actor-Network Theory requires the tracing of associations after the fact and without any recognition for preconceived social groupings (Latour, 2005:45). This approach allows Actor-Network Theory to trace the shifting relations of actors based on individual actions, which can each trace a separate set of associations, regardless of their location (Latour, 2005:32).

The second route raised by Walsham (1997:475) relates to Actor-Network Theory’s disregard of the Nature/Culture distinction. While recognising that actants can impact on actors and the analytical value of Actor-Network Theory inquiries, Walsham (1997:475) still perceives the functions of objects to be unilaterally determined by humans, mandating that “weaker asymmetries” between actors and actants be recognised. Walsham (1997:475) therefore falls short of “assuming a symmetric position for people and things” which he considers too extreme an acknowledgment.

Latour (1993:89, 1996a:737, 2005:39) disputes this position throughout his work and highlights that Actor-Network Theory is not an attempt to equate entities to humans, yet, removing the distinctions between humans and non-humans allows for a network to be traced. Admittedly, "much ink has indeed been spilled over […] the distinction between human and non-human", and the position of Latour is followed in this research because any alternative would be contrary to the character of Actor-Network Theory (Law, 1999:4). For this dissertation, the second point raised by Walsham underscores the Actor-Network Theory requirement to disregard the Modern Constitution to perform an Actor-Network Theory account. The Modern Constitution distinguishes nature from culture and nature, then, becomes an apt benchmark for growth as it forms a baseline when juxtaposed to culture. As the second section (3.2) of this Chapter emphasises, this distinction generates hybrids which the Modern Constitution cannot recognise (Latour, 1993:12).

The third line of critique concerns the vast array of actors that require recognition when tracing any network (Walsham, 1997:476). Latour (1990:130) does not shy away from this critique but acknowledges the significant task of tracing networks throughout his work. Latour (2005:9) considers this to be one of the reasons why the acronym "ANT" is so applicable to the theory as it "was perfectly fit for a blind, myopic, workaholic, trail-sniffing, and collective traveller". This critique emphasises the ability of an Actor-Network Theory account to "multiply the range of entities that could be shown to act" in any specific network (Lezaun, 2017:310). Given the vast size of market actors, an Actor-Network Theory account can recognise a vast number of possible actors. For this dissertation, the mapping of an equity market is not necessary as sufficient accounts exist to form a judgement, and such accounts will be referenced in the following section (3.5) and the Fourth Chapter of this dissertation.

The final line of critique reconnects to the third critique and introduces the criticism by Winner (1980, 1993). Walsham coins this route the 'amorality of Actor-Network Theory'. Walsham (1997:473) recognises that Actor-Network Theory does not distinguish actions based on their morality but notices that Bijker (1993:130) illustrates that individual Actor-Network Theory accounts have effectively identified the moral implications of Science and Technology Studies for society. The chief proponent of this route is Winner (1980, 1993), who generally applies this critique to social constructivism. However, Actor-Network Theory is not exclusively a social constructivist philosophy, and classifying it as such ignores much of the philosophy's nuance (Latour, 2005:11) since Actor-Network Theory includes "photons, planets and mushrooms no less than the language and disciplinary practice" (Harman, 2014:9).

Winner (1993:369) recognises that Actor-Network Theory develops new trails to understand the impacts of actants on actors. However, Winner (1993:369) also argues that Actor-Network Theory fails to recognise the broader, social implications of actants on actors while tracing networks.

Actor-Network Theory's amoral stance prevents it from understanding "the social consequences of technical choice" as it does not recognise how technological entities can influence broader social interactions. On the other hand, Bijker (1993:130) argues that Actor-Network Theory can be used to consider broader social implications, although few Actor-Network Theory accounts have done so.

Latour (1988:158) recognises Winner's critique but retains Actor-Network Theory's empirical foundations arguing that "nothing is, by itself, either reducible or irreducible to anything else". Latour (1990:130) suggests that a network needs tracing to evaluate morality within a network in the first place. The empirical evidence generated then allows for the assessment of a network's morality. Although Actor-Network Theory cannot evaluate the morality of a network itself, it can construct the networks which can then be used to evaluate morality. This solution is also implied by Winner (1993:370) when stating that "observing which groups are consistently excluded from power" the network traced demonstrates this exclusion. As Latour suggests, to make Winner's observation, one must first trace a network to determine which groups had been excluded from it.

Winner (1993:369) further argues that, as Actor-Network Theory reflects the workings of modern democracy, with numerous parties and groups which collectively dictate the policies of society, democracy can also exclude certain groups from power. Winner (1980:121) discusses several examples to illustrate this point, including the development of New York's Long Island bridges which had been designed to limit access to the island to the middle classes and upwards by lowering the maximum height of the bridges to exclude busses. The lower classes, which exclusively made use of busses, faced complications reaching Long Island while upper classes could easily access it through personal transportation. Long Island's bridges are still operational, and as these structures endure, their effects and the motives of their designers do as well. While Winner (1980:124) argues that an Actor-Network Theory account cannot recognise the continued effects of exclusionary practices, by tracing a network one forms the empirical evidence required to support of determining the morality of a network.

What we have determined thus far is that empirical evidence can provide for a source of evaluation, and the juxtaposition of networks would allow for the recognition of divergence between networks. However, in considering Winner's critique above, it seems that Actor-Network Theory would struggle to recognise established forces within the capital, and by extension, capitalist structures and equity markets. As has already been established, entities continue to be "made and unmade according to the logics of capitalism", and this fluidity only serves to complicate inquiries, equity markets being only one thereof (Latour *et al.*, 2018:587; Muniesa, 2019:56). However, while Actor-Network Theory had developed from a critique of the Moderns'

distinction between nature and culture, this does not exclude it from being applied to markets. Callon (1998a:45) indirectly talks to Winner's critique in considering how different agencies can "impose the events, actions, and relations that other calculative agencies have to take into account" and dominate markets in the process.

The initial contributions of Callon in the following section (3.5) serve to merge the "separate spheres or domains – science and the market" as Latour had merged nature and culture in the previous section (3.4) (Muniesa, 2019:57). Latour considers value from this perspective, which Chapter Four unpacks. Following the contributions of Callon, a considerable focus of Actor-Network Theory has been towards financial markets, providing insights and also establishing the main lines of criticism in its application which the remainder of this section considers (Lezaun, 2017:317).

Similar to Winner's critique regarding the morality of Actor-Network Theory, in applications to markets, Actor-Network Theory is critiqued for presuming the assumptions of orthodox Economics and then in its application, merely reaffirming these presumptions (Lezaun, 2017:317–318). For others, the approach unfairly focuses on "economists as the key protagonists", leaving other actants underdeveloped in accounts (Mirowski & Nik-Khah, 2007:217). As a solution, Bryan *et al.* (2012:311) and Hess (2013:189), suggest the inclusion of more pluralistic and balanced approaches in Actor-Network Theory accounts. What is essential for our present study, however, is precisely the application to the Neoclassical School of Economics.

In Chapter Two, this dissertation developed the Neoclassical School's origins and reaffirmed its use in Finance. Certainly, the use of Neoclassical Economics is not due to its accuracy but its foundations continue in Finance (Gibson, 1992:221; Ross, 2005:68–70). Necessarily, our present study unpacks the Neoclassical Economic perspective but the suggestion by Bryan *et al.* (2012:311) and Hess (2013:189) is also recognised. Specifically, developmental and ecological economic approaches are also explicitly considered in the following Chapter when situating our narrative into praxis, alongside the continual contrast of Latour's work to the Neoclassical School.

To further explore Actor-Network Theory, this section has developed and considered some of the prominent misunderstandings as suggested by Latour. Four limitations to Actor-Network Theory accounts further determined the extent of an Actor-Network Theory account. Finally, the contributions of an Actor-Network Theory account to Finance become apparent in light of its limitations, and this dissertation consequently considers the contributions of Environmental and Developmental Economics in the following section (3.5). One remaining criticism of Actor-Network Theory is its characterisation of actors. In addressing this critique, Callon (1999) applies Actor-Network Theory to explain the market, introducing the following section (3.5).

Despite the limits this section has identified, Actor-Network Theory can be "helpful in analysing power in global finance", and the following section (3.5) will unpack its approach (Porter, 2013:335). The nature of the calculations of actors, as we will find in the following section (3.5), vary based on the networks the actors find themselves in.

3.5 Actor-Network Theory and its application to Markets

Several studies have had economic markets subjected to inquiry informed by Actor-Network Theory.[33] In this regard, the work of Callon is invaluable for establishing a perspective that is "rooted" in Actor-Network Theory (Davis, 2006:4; Hardie & Mackenzie, 2007:57). For our present purposes, this section plots the existing applications and developments of Actor-Network Theory within markets. Beyond illustrating the application of Actor-Network Theory to markets, the implicit contrasts between Latour and the Neoclassical School are also gesticulated. This section further plots the practices which Chapter Four will consider in bringing the theory of Latour into praxis within equity markets. For this reason, the work of Callon will introduce the Actor-Network Theory approach to markets and supporting authors - Muniesa being the most significant - will then characterise the most salient principles of Actor-Network Theory and markets. The examples discussed below illustrate the considerations for applying Actor-Network Theory to market environments. The works of both Callon and Muniesa then finally set the ground for Latour's unique contribution, which the following Chapter (4) develops. This section firstly establishes a theoretical framework for the market as populated by actors therein. The calculative methods of the actors and the detailed requirements to calculate then follow. This section then develops a framework that accounts for calculative elements and Actor-Network Theory before the following section (3.6) concludes the Chapter.

Principally, Callon's work within economic sociology has the same foundation as Actor-Network Theory's non-discriminatory approach to actors and actants within networks (see Hardie & Mackenzie, 2007:57). An economic actor, like an actor within a network, consists not only of humans but also the trading screens, purchasing centres, cotton prices, financial charts, graphs, models, and other actants that can each influence trade (Doganova, 2019:259; Hardie & Mackenzie, 2007:58). Characterised as such, an economic actor can consist of many entities that form a collective network. As stated above, the variable ontology implied by this characterisation of actors recognises the potential for Economics to be performative as it actively influences the economy (Latour, 1987:254).

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[33] See for example Davis (2006), Dicken *et al.* (2001), Cetina and Bruegger (2002) or Hardie and Mackenzie (2007).

Callon's studies into the performativity of markets also motivated the establishment of the Social Studies of Finance, a recent research area that investigates financial performativity (Jefferis, 2018:291).[34] For Callon (1998a:32), the resulting network is "a process in which the calculative agencies compete and/or co-operate with one another" in forming a market. As with Actor-Network Theory, agencies have no inherent properties because the networks which they constitute characterise them, and the agencies, when applied to the market are often characterised as 'Market devices' (Doganova, 2019:259). Market devices "contribute to the construction of markets or reconfigure market situations" (Doganova, 2019:259).

Callon (1998b:256, 1999:182) recognises that specific traits characterise actors within the market according to economic theory and that actors "are calculating, know and pursue their interests, and make informed decisions". This definition, Callon (1999:182) holds, fails to recognise the intricacies proposed by Actor-Network Theory, which he then applies to the market. In following his definition above, the market consists of calculating actors that make distributed decisions to their interest through "equivalence measured by prices" (Callon, 1999:182). To make calculative decisions, Callon (1999:184) suggests that actors need to:

> "i) Establish a list of the possible states of the world;
> ii) Rank these states of the world (which gives content and an object to the agent's preferences);
> iii) Identify and describe the actions which allow for the production of each of the possible states of the world".

Interestingly, the first and second requirements suggested by Callon correlate with the Neoclassical School's approach to cardinal and ordinal utility, as discussed in Chapter Two. While Callon (1999:184) ranks states of the world, Neoclassical Economics hierarchises utility or determines utility through comparison. Callon and Latour (1997:5) further consider that "a list of preferences" are required to take action. Callon (1998a:4) also recognises that the market presumes a defined amount of calculable and arrangeable actions, to determine an action thereon. However, Callon (1998a:5) does not presuppose calculation in markets because "certain social structures or cultural forms favour calculation and selfish interests while others induce agents to be altruistic, disinterested, generous and even to give freely". Importantly, Callon (1998a:15) proposes that the networks that the various actors find themselves intertwined in position actors either towards or away from calculation. Callon's suggestion therefore supports the approaches followed in Socially Responsible Investment in recognising that profit maximisation may not be the only consideration in investing.

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[34] Mackenzie (2006) and other writers develop this concept extensively, giving rise to significant interesting findings and critique. In short, it is not the trader who acts but the collective which forms the fund which acts, similar to the characterisation of a pension fund or a hedge fund as an entity in law (Hardie & Mackenzie, 2007:76).

The divergence of calculative decisions is exceedingly prominent when recalling the varied approaches used in modelling to determine asset values. Differing models give rise to different states of the world on which calculations are based and, as Callon (1999:184–185) recognises, these states of the world are reconsidered continuously on the market. The reconsiderations are stressed during periods of market volatility, as has become more poignant in South Africa. Cases like Blue Label Telecoms which saw stock price losses of 43,07% during 2019 or more recently, how the JSE "stocks sunk back to 2013 levels" in March 2020 following the initial impact of the Coronavirus (Gernetzky, 2019; Reuters, 2020). Each of these instances signifies a recalculation by the market. However, despite this continual variation in information, actors in markets still calculate and make decisions.

Callon (1999:185) suggests that calculation is due to the networks of actors, indirectly recognising the critique raised by Winner above. By recognising that the "power and modalities of calculation are not equally distributed among all the agencies" the calculative power, and by extension, the ability for actors to have an impact on the market differs (Callon, 1998a:45). Agencies with more extensive networks, in turn, have more significant opportunity to shape the parameters of calculation used and thereby "decide on the location and distribution of surplusses" (Callon, 1998a:46).

Callon and Muniesa (2005:1238) illustrate this unequal distribution with the example of a supermarket. Whereas distributed consumers calculate using their tools and networks, it commonly capitulates to "the calculative power of supply, which is highly equipped, at least in the case of mass retail" (Callon & Muniesa, 2005:1238). However, as changes in calculative equipment provide consumers with greater autonomy, consumers may become more equipped (Callon & Muniesa, 2005:1238). The strength of mass retail's calculative agency draws from a much larger and more diverse number of entities, which is enhanced by professionals who attempt to better the product for inclusion within the distributed world of individual consumers (Callon & Muniesa, 2005:1238). David and Halbert (2014:518) similarly recognise the benefit of imposing calculative agencies on other actors within developing economies' real estate markets.

Nevertheless, as long as consumers make use of the calculative tools which are provided to them by mass retail, the autonomy of the consumer is lost, and although calculation still takes place in such instances, calculations take place from within the boundaries of the retailer, and the tools provided by the retail company (Callon & Muniesa, 2005:1238). The position may change when a consumer plans a purchase based on their calculative tools which rely less on the tools provided by the retail outlet (Callon & Muniesa, 2005:1239).

What is essential for this research, is the fact that the value of goods is not agreed upon when a good forms part of a consumer's world, instead, the process which determines value is changed. By bringing these processes of calculation into scrutiny, it becomes "increasingly difficult to conceal the power struggles behind commercial transactions" revealing the asymmetries of the calculation processes and highlighting the failure of "firms to take environmental criteria into account in their own calculations" (Callon & Muniesa, 2005:1239). In specifically considering calculations which relate to the environment, the extent of the entities considered struggle to be confined and need to be "*disentangled* and *framed*" to allow for calculations to take place (Callon, 1999:186–189). The framing of entities will now receive attention and introduce the framework for considering calculative elements alongside Actor-Network Theory after that.

Framing, as Callon (1998b:250, 1999:187) uses in citing Goffman (1971), is a well-known notion in the Economic Sciences which uses the term 'externalities' "to denote all the connections, relations and effects which agents do not take into account in their calculations". Neoclassical Economics characterises markets as "closed systems" and assume market efficiency, as the Second Chapter has discussed (Marinescu, 2016:48). This section, on the other hand, illustrates that:

> "Neoclassical economics offers an internally consistent account, but one that is […] unable to satisfactorily account for many of the most important dimensions of our activities – particularly with respect to the human and non-human natural communities and processes of which we are part" (Pelletier, 2010:1893).

The Neoclassical School, therefore, mirrors the Modern Constitution in being unable to recognise the influence of nature on culture, or non-human natural communities in our economic activities. One example which recognises the inconsistent account of Neoclassical Economics is an externality. Externalities, Callon (1998b:247) suggests, proves inefficiency within the market through the variation of the "private marginal income and marginal social costs". Developmental Economics also recognises externalities as a cause of market imperfections and potential market failure in the traditional Neoclassical School of Economics (Callon, 1998b:247; Todaro & Smith, 2012:779).

Callon (1998b:247) suggests that externalities create market inefficiencies by separating the "private marginal income and marginal social costs" as factored into the markets and, like Latour's hybrids discussed above, are excluded from consideration. In attempting to recognise externalities, framing can determine how effective a market is based on what it includes (Callon, 1998a:250). The Economic Sciences generally suggest that externalities "should be regarded as accidental and consequently that framing should be perceived as the norm towards which everything should tend" (Callon, 1998b:251).

Considering the handling of externalities by the Economic Sciences, Callon (1998b:251) suggests that economists have two possible options. Either they can identify and reformulate their frames or intentionally limit their framing. For the purposes of our present study, it is necessary to note that Development Economics generally recognises that for environmental matters, "the internalization of externalities is not so easily accomplished" (Todaro & Smith, 2012:486). Callon (1998b:255, 1999:188) also comes to a similar conclusion when considering the framing of environmental issues where "the effort required is often immense" (Callon, 1998b:257). Nonetheless, calculation is a critical requirement for the market as its absence renders negotiations between actors impossible (Callon, 1998b:260). Sustainable and Responsible Investment approaches, on the other hand, extend the existing calculative frameworks in markets to give greater recognition for externalities (Haigh & Hazelton, 2004:64-65). A range of market indices which consider Environmental, Social and Governance Factors have also developed to provide different weightings and considerations to each factor and its considerations (Haigh & Hazelton, 2004:64-65).

The externalities in the Economic Sciences also recharacterises utilitarianism, as considered in Chapter Two (Callon & Latour, 1997:7). In light of the vast entities which Actor-Network Theory uncovers, it becomes increasingly difficult "to find out who is the owner and who the profiteer" of a specific action. As we covered within the Neoclassical School, utilitarianism only recognises utility in the culture-side of the Modern Constitution's binary, which is only partially measured. Marginal utility subjectively defines value on the market (Reinecke, 2010:564).

Consider, for example, the impact of the mining operations around Johannesburg discussed above. Besides the significant environmental costs of the mining operations which are not recognised, the impact of slag inhalation on the health of the locals is also not considered. However, the complete recognition of all externalities would require "unending, always ongoing operations" which would never allow for calculation to take place (Callon & Latour, 1997:7).

Crucially, Callon and Latour's (1997:10) approach concludes that calculating, utilitarian actors do not "actually exist". Latour (2017:263) appreciates a similar point when reconsidering humanity's relation to nature and recognises that the possibility to consider all entities is "a fiction", which Chapter Four develops. For the time being, it is sufficient to note that even though all entities cannot be considered, this does not imply that the existing entities could not be reevaluated and altered. Callon (1998b:264) suggests that actors continually negotiate this environment within their existing framework, remodelling the market in the process.

In summary, framing is an essential activity for the market as it defines the goods thereon and the actants who trade them (Callon, 1999:188). The exterior of the calculation is referred to as its

externalities, and by framing, the internality of the calculation is determined (Callon & Latour, 1997:6). Externalities refer to all the connections and actants which are not included within the framing of a good or actant which defines the scope of factors included within a calculation (Callon, 1999:188). Crucially, Callon (1999:188) suggests that in attempting to include externalities within calculations, more externalities come to the fore and that total "framing is a contradiction in terms" (Callon, 1999:189). Nonetheless, to be recognised within the market, externalities need to be measured and calculated (Callon, 1998b:259). Some existing market approaches, like Socially Responsible Investment, attempt to extend the recognition of externalities through the recognition of Environmental, Social and Governance Factors in their calculative frameworks. Similarly, to trade commodities on the market, they need to be framed, which introduces a second worthy point: 'disentanglement' (Callon, 1998a:18). For ownership to transfer, commodities need to be "decontextualized, disassociated and detached" from the seller, ending the network of relations between the commodity and the seller in the process (Callon, 1998a:19).

The benefit of such an approach is its ability to recognise the market not only as a device which determines price through calculative agencies, but also to recognise that calculative agencies can vary and create differing values (Callon & Muniesa, 2005:1245). Most importantly, by making such calculations explicit, it allows for "open discussions and even public debates on the way of organizing calculations", which Chapter Four develops (Callon & Muniesa, 2005:1245). Considering the focus of this dissertation, the variance of calculative devices in market settings brings to light the fact that calculative devices "articulate the economic and political" differently (Doganova, 2019:260). Citing Akrich (1992), Doganova (2019:260) suggests that by evaluating the variance in calculative devices through Actor-Network Theory, we can recognise what each calculative device considers valuable.

Following Callon and Muniesa's (2005:1229) approach demarcates markets for their ability to analyse a mosaic of actors with varied aims within an environment where the nature of goods is uncertain. In this sense, markets consist of three calculative elements which collectively give this ability: goods, agencies, and exchanges (Callon & Muniesa, 2005:1231). From this basis, Callon and Muniesa (2005) propose a framework that can account for the calculative elements.

Principally, Callon, and Muniesa (2005) propose a definition of calculation which considers both qualitative and quantitative aspects. However, calculation is not considered in the ordinary sense of the word. Like Actor-Network Theory, it focuses on the "material movement" as suggested by Latour's (1987) centres of calculation which Chapter Four develops. For Callon and Muniesa (2005:1231), the first step is to situate all the entities which act in the market on one platform, which in turn forms the foundational platform within which entities act. By following the definition

of actors used by Actor-Network Theory, one recognises the vast breadth of entities alongside an equally vast number of possible configurations for the market (Callon & Muniesa, 2005:1232).

Should this platform be created and all the necessary actors be accounted for, actors can now be subjected to the interactions, variations, and relations of other actors which can be traced (Callon & Muniesa, 2005:1231). Finally, the extraction of a result is necessary to conclude the process:

> "A new entity must be produced (a sum, an ordered list, an evaluation, a binary choice, etc.) that corresponds precisely to the manipulations effected in the calculative space and, consequently, links (*summa*-rizes) the entities taken into account" (Callon & Muniesa, 2005:1231).

The entity created, which is an amalgamation of the entities taken into account, can now be extracted and situated within an alternative calculative space (Callon & Muniesa, 2005:1232). The calculation does not need to be re-opened and, when situated within a following calculative space, it functions similarly to the black box unpacked above.

The benefit of this approach is its flexibility. While recognising the broad definition of calculation a diaspora of calculative spaces can exist, which could equally be an "invoice, a grid, a factory" but also "a trading screen, a trading room, a spreadsheet,[or] a clearing-house" (Callon & Muniesa, 2005:1231). The definition also allows for rectification in instances where the calculation extracted is deemed flawed, which could reflect a flaw in one of the three initial steps (Callon & Muniesa, 2005:1232). This flexible approach also allows an inquiry to determine which entities to include or not, and therefore for both qualitative and quantitative judgement to form part of the calculation (Callon & Muniesa, 2005:1232).

Similar to the process of economisation of Latour which is developed below, this form of calculation focuses on the structures of entities and how they contribute or detract from the calculability of the collective (Callon & Muniesa, 2005:1232). Importantly, economic agencies for markets and investment markets differ. As Chapter Two had developed, investment markets are concerned with the generation of additional capital through a social relation considered "capitalisation" (Muniesa *et al.*, 2017:51). Ordinary markets, on the other hand, are concerned with the process of "marketization" which Çalişkan and Callon (2010) frame as being concerned with the trading of commodities through market transactions. Alongside "commercialisation", both "marketization" and "capitalisation" are considered modalities for "economisation" and Latour's understanding of economisation follows in Chapter Four (Doganova, 2019:260).

According to Callon and Muniesa's (2005:1233) model, goods and services are characterised as entities since both can form part of a market transaction. Goods are made calculable through distributed agencies which include both humans and non-humans (Callon & Muniesa, 2005:1236). One example used by Callon and Muniesa (2005:1237) to illustrate this point is that

of Preda's (2006) stock ticker discussed above. Preda (2006) proposes that charts, through the introduction of the stock ticker and with it, the complete collection of price data, act as a cognitive instrument which extends the capabilities of the trader. Other examples abound within the economic environment, including computer coordinated high-frequency trading, risk estimates generated by risk models, and automated credit scoring (Porter, 2013:335). In the Economic Sciences, as in other fields, it is common that methods and tools develop to assist the calculating processes of the field in extending the cognitive capacities, like the use of modelling for the economist. As such, both models and the economist influence the calculation (Callon & Muniesa, 2005:1237).

Specifically, within the hedge fund environment, Hardie and MacKenzie (2007:70) note that the cognitive processes that inform the decision making of a fund have various forms and extend beyond the trading room. Although traders primarily make use of electronic mail messages, it is not exclusive, and decisions made in other countries can reach them via telephone, television, and teleconferences (Hardie & Mackenzie, 2007:70). Electronic messages, however, focus the attention and frame the interpretation of the trader on a specific set of data that is available on the television (Hardie & Mackenzie, 2007:71). Recognising this limited capacity for cognition and the vast opportunities for investment, Hardie, and Mackenzie (2007:76) note that hedge fund traders tend to make use of selective markets in performing calculations, or possibly imitate other actors.

As with the stock ticker, further technological development has also made the market's mechanisms more explicit and traceable across the vast range of manners in which supply and demand interact, each making use of distinctive calculative agencies (Callon & Muniesa, 2005:1240). The market transaction, in comparison, requires several social connections to exist and does so only momentarily. After the exchange taking place and the transaction completes, the connections cease to exist. Callon and Muniesa (2005:1233) further consider that the exchange will only occur if the features of the good/service presented for exchange represents a value for the buyer, which is qualified as either a range or a specific price.

Similar to Actor-Network Theory, the strength of a calculative agency would increase if it can recognise fluctuating relations between a significant and diverse number of actors, but also "formalize procedures and algorithms likely to multiply the possible hierarchies and classifications between these entities" (Callon & Muniesa, 2005:1238).[35] However, given the high number of entities, the "interconnected world is formally endless", and inquiries focus on areas that may contribute in unique ways (Hardie & Mackenzie, 2007:74). In this way, Actor-Network Theory can

[35] For an investigation into the power of multiple calculative agencies within the Socially Responsible Investment environment, see for example Giamporcaro and Gond (2016).

contribute towards understanding how economic actors are composed and the connections between them (Hardie & Mackenzie, 2007:77–78).

Callon and Muniesa (2005:1240) also propose that the market be considered from an alternative perspective and use the transaction as the initiation thereof, characterising a market as a "microstructure" which consists of a specific number of agents and transactions as situated within a particular "architecture of exchange". This approach has found extensive application in financial market analysis and specifically for studying price-setting mechanisms (Callon & Muniesa, 2005:1240). The entity for trade must first be transformed into a good which can then have a value assigned to it to facilitate this process. Callon and Muniesa (2005:1233) believe that this takes place through the reiterating "processes of mutual adjustment between things and human beings" which requires two simultaneous procedures: objectification and singularisation (Callon & Muniesa, 2005:1234).

Objectification requires that the entity become a good, and the continued adjustments transform the entity into a good, which can then be valued within the market (Callon *et al.*, 2002:197). Concurrently, the vast network of attachments held by the purchaser needs to be explored in the account and then transformed for the good to be included therein. The good then forms part of the networks constituting the world of the purchaser through a process called 'singularisation', which was initially proposed by Chamberlin (1946) (cited by Callon and Muniesa, 2005:1233). The combined function of objectification and singularisation avoids the characterisation of a good's properties as either intrinsic or extrinsic as the good's properties are formed through the continued adjustments which constitute its properties (Callon & Muniesa, 2005:1234). However, Callon and Muniesa (2005:1235) recognise that the systematic inquiry into the networks of the purchaser is a significant task, and "to expand the market it is necessary to produce more and more attachments".

In the place of the approach used in the Economic Sciences, Latour (2004:135) proposes the "progressive economization of relation", a performative process that measures the economisation of interactions between actors. This 'economisation' focuses on relations rather than attempting to define a universal economic framework. Following this variable ontology uniquely describes Economic Sciences as 'performative' which explains the ability of markets to shape themselves (Hardie & Mackenzie, 2007:59).

Callon (1998a:23) initially proposes this concept when discussing the "embeddedness of economy in economics". Therein, Callon (1998a:3) is able to characterise markets as "the process in which calculative agencies oppose one another" which collectively determine price. Chapter Three has developed this approach but Callon's focus remains "on what markets amount to, and

how their formation can be understood in terms of political compromise" - which stops short of developing an association with Sustainable and Responsible Investment and robust understanding of value therein (Muniesa, 2019:60).

Latour *et al.* (2018:591) nonetheless, considers this approach as one of the lenses to understand Capitalism and cites Callon and Muniesa (2005) for their "sociology of economics" which "seeks to study how you calculate 'value', 'labour value'". The second approach to consider Capitalism, Latour *et al.* (2018:591) posits, is through an ecological focus, which Chapter Four will unpack.

A common conclusion in Actor-Network Theory inquiries into financial markets is that many entities influence traders, while actions within markets are affected by several actors and actants alike (Hardie & Mackenzie, 2007:76). In turn, these inquiries emphasise the interconnectivity of international markets and the possibilities for markets to influence one another, especially in a financial crisis (Hardie & Mackenzie, 2007:76).

Callon and Muniesa (2005:1245) suggest that there exists significant research possibilities in studying the formation of markets and the relationship the market has with justice and equality and away from it as a mere centre for calculation from such a perspective. In short, this section has situated the Actor-Network Theory approach developed in Section 3.3 to the market. Building on the critique of Winner in Section 3.4, this section firstly considered the contributions of Callon, followed by Callon and Muniesa and plotted the considerations which an Actor-Network Theory account would need to consider when applied to the market. While this dissertation will not undertake the application, by reviewing the processes required to apply Actor-Network Theory, the unique character of an Actor-Network Theory account of the market comes to the fore.

3.6 Conclusion

Following Chapter Two's characterisation of markets, this Chapter unpacks Actor-Network Theory and illustrates its applicability to the market environment. In achieving this end, the first topic which received attention was the Moderns. The Modern's urge towards progress receives attention alongside the Modern Constitution and its false binary is considered in Section 3.2. Section 3.2 then establishes the Nature/Culture distinction made by the Moderns, and how it forbids any comparison to that of the premoderns. Finally, Section 3.2 then explains how hybrids form from the strict distinction of the Moderns, and the processes the Moderns use to 'purify' entities into either of the two camps. In comparison, the premoderns considered the associations between nature and culture, and as a solution to the Modern Constitution, Latour proposes Actor-Network Theory.

Principally, an entity is recognised by Actor-Network Theory when it can account for its action, which Section 3.3 establishes (Latour, 2005:53). This low listing requirement allows numerous entities to qualify as actors or actants which collectively form networks. If the entity merely transfers actions through a network from another actant, it is an intermediary, similar to how financial advisors relay market information to their clients. Collectively these two elements, actors, and networks, form the exchange of *Actor-Network* Theory. Actor-Network Theory was then further developed in Section 3.4 by considering some of its most prominent critique and confusion.

After developing Actor-Network Theory, the penultimate section (3.5) applies Actor-Network Theory to a market setting, moving into praxis for market environments and discussing some of its critical considerations. Callon sets the basis for applying Actor-Network Theory to markets and his contribution is explored, followed by that of Callon and Muniesa. In comparison to the Neoclassical understanding discussed above, Callon (1999:182) characterises the market as "an institution which mixes humans and non-humans and controls their relations". Callon (1999:194) recognises that Actor-Network Theory, as an alternative to *Homo Oeconomicus*, allows for the recognition of actions that do not fit squarely within its Neoclassical definitions. By recognising the networks in which actors are situated, *Homo Oeconomicus* can be self-interested, altruistic or any combination of the two.

As this Chapter has unpacked Actor-Network Theory, now reinforced in its application to markets, Chapter Four navigates Latour's redefined collective after re-evaluating the distinction between objects and subjects. Latour reiterates his stance on the Moderns and builds on his rejection of the subject/object distinction in extending the concept to include matters which relate to the environment. One clear example thereof is the juxtaposition of the Moderns to Latour's understanding of "ecology" (Harman, 2014:57). Rather than viewing the two terms as antonyms, what Latour proposes is to consider 'ecology' as the combination of actors (and actants) which, at the time of plotting a network, cannot yet be conclusively established (Harman, 2014:57).

Following this suggestion, ecology is no longer an exclusionary term as actors are not limited to humans but additionally – and more surprising for Latour (2004:79) – are the new connections between humans and objects. This is explored further in the following Chapter and considered in praxis through Sustainable and Responsible Investing.

CHAPTER 4

LATOUR'S VALUE, POLITICAL ECOLOGY AND EQUITY MARKETS

4.1 Introduction

The Third Chapter of this dissertation unpacked the fundamental principles of Actor-Network Theory and illustrated how Actor-Network Theory can be applied to the market in juxtaposition to the Neoclassical School. In developing the interconnections between Actor-Network Theory and Neoclassical Economics, externalities that are not accounted for within Neoclassical Economics arise. This Chapter builds on Chapter Three by developing Latour's understanding of the entities which Actor-Network Theory had brought to light and their role in reconsidering what we value in equity markets.

Fraser (2010:58) suggests that Latour's position on value is inspired significantly by the work of Alfred North Whitehead (1985:185). Nonetheless. the focus of this research is solely on Latour's contribution, rather than a dialogue between Latour and Whitehead. In short, Whitehead's (1920:26) view is parallel with Latour from the base understanding that the Moderns' distinction is flawed. Whitehead also holds that studies of entities be performed in terms of their relatedness in an attempt to avoid the divide. From this basis, Whitehead (1985:116) then recommends that value be created through the realisation of the relatedness between entities. Therefore, "all relations are value relations" and, by extension, value cannot exist outside its relations (Fraser, 2010:67). Latour agrees that values are determined by the connections between entities (cited by Fraser, 2010:67). Muniesa (2019:59) suggests that Latour's approach to Economic Theory followed from Gabriel Tarde, which Latour (2012:117) proposes is a "forefather" of Actor-Network Theory.

Doganova (2019:256) suggests that the first application of Actor-Network Theory which related to value by Latour, was within Latour and Woolgar's *Laboratory Life* (1979), which will open Section 4.2. However, insofar as it relates to a broader ecology, the concept is developed significantly in Latour's *Politics of Nature* (2004) which has been described as "an often brilliant attempt to theorize 'political ecology'" - and will be a chief source for Section 4.2 (Wainwright, 2005:116). This provides the tools to navigate the collective which Actor-Network Theory had established by considering Latour's approach to the traditional philosophical debate on the Fact/Value binary, but will not attempt to reconsider the scientific value of research, which Latour's work within value is rooted in (Doganova, 2019:257).

In the initial portions of the Section 4.2, it will become clear that Latour (2004:94) proposes that the Nature/Culture distinction not be made, disregarding the Modern Constitution and identifying a collective consisting of all entities. Simply, what Latour (2004:93) requests is that entities be examined before their classification, allowing for the recognition of "what is common and what is private, what is objective and what is subjective". To create a platform for this collective, the crisis of the Moderns has mandated the removal of the Nature/Culture divide (Latour, 2004:91).[36] It is from this seemingly neutral position that Latour discusses the concepts of fact and value. Since the Modern Constitution distinguishes between nature and culture, it also fundamentally distinguishes what *is* from what *could be* (Latour, 2004:101). Similar to the Nature/Culture divide, this distinction allows the Modern Constitution to contextualise what *could be* according to what *is* (Latour, 2004:101).

It is from this basis that Latour (2004:3) rejects the belief that political ecology is only concerned with nature, as this characterisation subscribes to the Nature/Culture binary of the Moderns. Instead, 'ecology' is characterised as the reversal of 'modernism' by recognising the interactions between entities across the Nature/Culture divide through "due process" and forming Latour's (2004:8) political ecology. In summary, what Latour's (2017:281) theory provides us is an opportunity to "become capable of *responding*" through a heightened awareness of others, which situates humans and non-humans as cohabitors of the planet. Each entity is in turn now able to respond and hold the other accountable through their actions and reactions and in Section 4.3, this new collective is framed with an environmental focus (Latour, 2017:291).

Finally, the insights gained from Latour's redefined collective is situated within equity markets. Nonetheless, Muniesa (2019:58) suggests that a critical insight into Latour's understanding of value is provided in Latour's 'centres of calculation', which opens Section 4.2.

4.2 The Fact/Value dichotomy as unpacked by Latour

Latour's conception of knowledge and his 'centres of calculation' introduce this section and lead to Latour's understanding of facts and then values. In short, Latour suggests that the traditional Fact/Value binary be quartered, recognising the interactions therein. According to Harman (2014:62), Latour bifurcates the traditional Fact/Value binary "into a fourfold structure" and proposes the power to take into account as well as to arrange in rank order as alternatives to fact

[36] Latour identifies a metaphysical challenge with this recognition as his distinction inherently classifies an entity as either relational to humans or characterised in itself, which has been subject to critique. Harman (2014:60), for example, argues that this non-relational reality could not be knowable in itself.

and value. The power to take into account and the power to arrange in rank order then each consist of their own separate Fact/Value poles.

The task of quartering the traditional Fact/Value binary is assigned to four processes, which relate to four corresponding professions. The four professions are then assisted by further professions and processes in forming a new collective. While this process may seem convoluted, Latour (2004:111) contends that the process is not "introducing any dangerous innovation" and aims to point out that the artificial distinction between fact and value limited the opportunity for the recognition of entities.

Given the focus of this dissertation, the aspects addressed here are developed alongside their insights into the Economic Sciences as each of the components provides their unique contributions, which are then explored in moving towards praxis to equity markets. From this background, Latour "left unfinished both the task of identifying in investment a distinctive mode of enunciation, and of signalling its moral, political and eventually theological (if need be) limits" (Muniesa, 2019:60). Nonetheless, Section 4.3 considers Latour's contributions insofar as they relate to the equity market environment.

Chapter Two of this dissertation unpacks the accumulation of capital according to Adam Smith. Therein, Smith ([1776]1976:74) suggests that when capital is accumulated, it is naturally used to "employ industrious people" to further maximise capital, benefiting society in the process but this Chapter's focus on value and the equity market resituates this concept within the scope of investments. Similar to the asset managers continually tweaking their asset portfolios to maximise their income, Latour (1987:223) considers investments as being "capital that is something (money, knowledge, credit, power) that has no other function but to be instantly reinvested into another cycle of accumulation". However, Latour (1987:223) makes this consideration from the basis of the accumulation of knowledge and ultimately rejects the use of the word capital in this consideration as the term has "had too confusing a career".

For the accumulation of knowledge to take place, Latour (1987:223) posits that three requirements must be satisfied. Firstly, the knowledge form should be exchangeable (Latour, 1987:223). Secondly, it should not be altered in the process of its exchange and finally, it should be able to be collected (Latour, 1987:223).

Latour makes use of a wealth of examples to explain this process but for this piece, the example used to measure economic activity proves most relevant. In short, Latour (1987:227,232) explains that to get a view of a country's economy, economists need to "travel inside narrow and fragile networks". These networks will combine numerous components which do not all narrowly form

part of their fields, collectively forming “centres of calculation” which can each be included within a greater centre. Practically, economists, and others, follow a lengthy process which, at the end, needs to be condensed to articulate the process’ findings (Latour, 1987:232–233). From compiling a set of questionnaires, to the inputs from firms, to the eventual summary of the findings made and the findings’ inclusion in the calculation of a country’s Gross Domestic Product.

A calculation like the Gross Domestic Product of a country is a weighty task, and centres of calculation would need to be extensively expanded in either of the three requirements to successfully calculate it (Latour, 1987:243). Alongside the three requirements, the “very growth of the centres entails the multiplication of instruments which, in turn, oblige the information take a more and more mathematical shape on paper” that the calculating economists need to consider.

Latour does not further expand on the possible application of ‘centres of calculation’ to financial markets, but this does not imply that its application is not possible (Muniesa, 2019:61). In citing Latour (1987), Callon and Muniesa (2005:1236) consider the calculative agencies in markets as “collective hybrids, ‘centres of calculation’”, which was unpacked in the previous Chapter (3). Chapter Three further contends that what Latour *et al.* (2018:591) considers “the sociology of the markets” developed by Callon and Muniesa (2005) studies value. In specifically considering Latour’s contributions, value is considered in relation to fact.

Latour’s distinction reminds of Hume’s (2003:334) what “*is,* and *is not*” to what “*ought, or ought not*”. In short, what would later become known as Hume’s law suggests that “descriptive statements can only imply other descriptive statements, and never imply norms or guidelines” (Ballet *et al.*, 2013:29). The Modern Constitution, on the other hand, interprets ‘fact’ as resembling a uniform, mechanistic mononaturalism, and ‘value’ a pluralistic and fluid multiculturalism. The Modern Constitution held that these two concepts – what *is* and what *can be* – needed to be distinguished to allow for their separation. The protected fact, or what *is*, was kept separate from an “indefinite multiplicity of opinions”, what *could be* (Latour, 2004:94). Latour (2017:25) notices that this distinction, although important for philosophers and ethicists, has not been upheld by “the heads of the major companies under threat” in the new climatic regime which Section 4.3 considers.

In comparison to the Modern Constitution, Latour’s interpretation of facts and values is guided by four processes which, in turn, quarter the traditional philosophical Fact/Value dichotomy (Harman, 2009:63). This arrangement between facts and values allows for the impact between the two to be recognised and demonstrate that “In spite of the vast literature on the indispensable chiasmus between facts and values, it is evident that defining the former necessarily bears decisively on the latter” (Latour, 2017:34).

For our current purposes, the deconstruction of the two terms emphasises the propensity of the Modern Constitution's approach to externalise entities, within the realms of both fact and value (Latour, 2004:124). On the one hand, Latour (2004:111) proposes that, rather than distinguishing between facts and values, one should distinguish between the "power to take into account" and, on the other hand, the "power to arrange in rank order". These two powers are each subdivided into two categories forming the four subcategories in the split.[37] The power to take into account is concerned with identifying actors which have not been included within the Actor-Network.[38] The power to take into account therefore bases itself within both categories of the initial fact and value dichotomy while the power to arrange in rank order mirrors this placement (Harman, 2009:62).

For Latour (2004:96), facts are not final, but the product of a process of elaboration which is subject to rediscovery and alteration. The Moderns ignore this developmental process and suspend the concept as definitive regardless of the scientific method by which it creates the fact. For Latour (2004:96), facts are formed from ongoing scientific activity, discovery and rediscovery. The Moderns, on the other hand, fail to recognise the dependence of facts on Science and that its formation is bound to present scientific theories which require contextualisation based on the limited information available to form them (Latour, 2017:164). Variation in existing data or alternate methods could naturally create alternative facts (Latour, 2004:96). Latour (2004:99), accordingly, argues that the term 'fact' fails to "describe the production of knowledge" because it does not take into account the role of theories, data, or the scientific process in forming facts.

Within the Economic Sciences, one of the clear examples of the re-discovery of 'fact' is *Homo Oeconomicus'* development in economic modelling which the Second Chapter of this dissertation had considered. Classical Western economic thought characterised *Homo Oeconomicus* as a rational actor who maximises wealth and pleasure (or utility), based on a complete set of information (Persky, 1995:222).[39] By 1955 however, Simon (1955:380–381) recognises that *Homo Oeconomicus* does not realistically characterise economic actors, which apply their limited information processing capabilities sequentially to several choices suggesting changes. Although treated as fact within Classical Western Economics, *Homo Oeconomicus* was changed to more realistically resemble actors in financial markets. These changes, in turn, led to a greater understanding of market phenomena and market relations (Anderson, 2000:200; Fromlet, 2001:64). Contemporary *Homo Oeconomicus* is once again treated as fact in economic modelling, but altered models of *Homo Oeconomicus* in the various sub-fields of Economics

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37 The four subcategories are perplexity, consultation, hierarchisation and institution which are discussed below (Latour, 2004:134–136).

38 The word 'which' rather than 'who' recognises the potential role of objects in tracing the network.

39 *Homo Oeconomicus* was initially proposed by John Stuart Mill in 1836 and the concept is unpacked in Chapter Two of this dissertation.

continue to re-evaluate the concept by increasingly recognising the limited rationality of choices often made in dynamic investment environments (Thaler, 2000:134). Behavioural Finance, for example, has had a similar impact on orthodox Finance theory as investors can no longer be commonly characterised as rational actors with limitless calculating abilities (Hardie & Mackenzie, 2007:75).

When *Homo Oeconomicus* was formed in 1836, it was a rational actor, but subsequent economic theories have chipped away and replastered the figure to more adequately reflect available data generated by scientific activities. While *Homo Oeconomicus* was considered a fact for Economics, the concept has changed several times and these changes bring to light the process of the formation of a fact as identified by Latour (2004:96). On the other hand, the Modern Constitution's interpretation of facts does not recognise this development, rediscovery and changes, and would be unable to compare the *Homo Oeconomicus* fact of 1836 to the 2020 fact. Similarly, by applying Actor-Network Theory to emissions trading markets, Lane (2012:583) explains how market efficiency is assumed in the Neoclassical Economic Sciences as 'fact', disallowing the recognition of the externalities which the market forms.

Now that Latour's understanding of facts has been unpacked, the concept value, which Latour (2004:97) notes for having its own set of concerns, can follow. Latour (2004:97) understands the term to be dependent on the concept 'fact' as characterised by the Moderns. Latour (2004:98) argues that universal values cannot develop without considering the factual setting to which it is applied. Only in instances where facts are determined can values be attributed to facts, and Latour (2004:97; 2017:164) explains this through an example in scientific development. In Latour's (2004:97) example, after the discovery of cloning, now the "grave ethical question" of whether cloning should be performed comes to the fore. Value, as described by the Modern Constitution, is consequently dependent on the existence of the facts to which it can be applied. In Section 4.3 the process of creating 'facts' is considered in light of the global ecological crisis' evidence. Therein, it is made clear that through the dispersion of the discussions leading to 'facts', "industrialists and financiers" could delay the necessary "moral imperatives" which followed from their creation (Latour, 2017:26;29). Principally, for value to be ascribed to a certain event, the facts substantiating the inquiry need to exist because "values always come too late and they always find themselves placed, as it were, ahead of the accomplished fact" (Latour, 2004:97).

Since value requires the existence of facts to be applied, naturally, value is influenced in turn by the sum of facts available (Latour, 2004:97). For Latour (2004:97), value is therefore dependent on the *locus* of facts at the time of valuation. Within the Stock Market, this approach would support Mackenzie (2006:66–67) who notes that only "new information" can influence pricing. Should

value attempt to be isolated from fact, in search of universal values and ethical principles, then value could not be applied to fact (Latour, 2004:98).

While the Modern Constitution would be unable to recognise this phenomenon, due process allows for the recognition of this flux, matters of fact are not rigid and inflexible but analogous to matters of concern, which are variable and transient (Latour, 2004:103). Latour (2011a:72) identifies this flux prominently when considering how natural entities have increasingly been "the hottest topics of public controversies" as the 'facts' become disputed.

Recently, this phenomenon has found clear expression in the "flurry of figures, graphs and projections" relating to the Coronavirus Pandemic which sees diverging 'facts' mandating diverging values (Richardson & Spiegelhalter, 2020). Hatswell (2020:203), for example, recognises how COVID-19 modelling had influenced and challenged the confidence of the United Kingdom's governmental advisors, which then translated into ambiguous policies. Noting the intertwined nature of the two concepts exposes the possibility of value influencing fact (Latour, 2004:98). In South Africa, "there have been a variety of sources offering competing perspectives on how the Coronavirus is spread" with regulatory responses regularly in contradiction to the views of experts (Metz, 2020:5). In these instances, the fact forming process is only further exposed because of the divergent perspectives of the Economic Sciences and public health on the policies required in response to the virus. While lockdown strategies decrease the transmission of the virus, it necessarily also decreases economic transmissions (Ajam, 2020:3). The Economic Sciences' 'facts' which inform the 'value' of opening the South African economy then contradict public health's 'facts' which 'value' containing the pandemic.

Because the Modern Constitution characterises facts as unalterable, the possible influence of values thereon cannot be recognised. Nonetheless, value can gradually alter matters of fact during the scientific processes forming them. While the concepts remain distinct according to the Modern Constitution, they continue to influence and change one another, reshaping what is characterised as inflexible to the Moderns. If sustained under the Modern Constitution, value can generate a world described as consisting of unalterable facts which include "everything that one *would like to see in existence*" (Latour, 2004:98).

While Prychitko (2003:389) recognises that Economics is not "a free-floating rational activity detached from influences of culture", particularly within the field, Latour (2004:99) notes that the distinction has allowed for the discipline to include values while describing matters of fact. However, the distinction has use as the recognition of the influence of values on facts allows for the identification of such instances in the first place.

Nonetheless, conforming to the distinction does not solve the concerns raised above (Latour, 2004:100). Latour (2004:102) also recognises that the hasty rejection of facts and values would require the rejection of the metaphysics it supports without solving the concerns raised either. Accordingly, the distinction cannot be disregarded, but *how* it is recognised can be repackaged to accommodate the concerns raised by Latour (2004:111). The Modern Constitution's difference between facts and values is converted into distinguishing between two powers which will represent the collective: the "power to take into account" and the "power to arrange in rank order" (Latour, 2004:108,111). Latour (2004:234) later refers to the two powers in terms of political houses: "the upper house, represents the power to take into account and the other, the lower house" which collectively have the power to recognise the new entities which Actor-Network Theory traces.

For the conversion to take place, Latour (2004:103–108) first has to unpack the two concepts, 'fact' and 'value'. Unpacking fact first, Latour (2004:104) notes that the process of fact generation has two periods: when a fact is being "discussed", and when a fact is "no longer discussed". Initially, facts are discussed, creating the opportunity for the characterisation of a fact to account for additional data (Latour, 2004:103). This crucial point allows for the recognition of previously omitted entities to form part of the collective (Latour, 2004:104). "Facts" therefore, "signal the existence of surprising actors" as they signal the existence of actants which were previously omitted from the collective, altering the existing number of entities through their unpredicted actions. For Latour (2004:103), facts, then form part of the collective, a feature called "perplexity". Because perplexity is concerned with external realities, it replaces the fact share of the Fact/Value distinction. However, unlike facts, perplexity is chiefly concerned with the number of entities to be recognised (Latour, 2004:103).

When facts are discussed, their outcome is still uncertain, and as soon as facts are no longer discussed, this status changes (Latour, 2004:104). Facts then become assumed knowledge and take the same status in the Modern Constitution as "states of nature", and are utilised like black boxes (Latour, 2004:104). For example, *Homo Oeconomicus* was considered fact and assumed knowledge in 1836 but the black box of *Homo Oeconomicus'* facts were unpacked by Simon (1955:380–381) in 1955. From 1836 to 1955, the undisputed nature of facts arguably meant that facts can no longer identify new entities, and fact became a "certainty" (Latour, 2004:105).

As with *Homo Oeconomicus* in 1955, certainty does not imply that a fact is final. For Latour (2004:106), a fact can still be subjected to an appeal to consider other entities. The request itself is a *prima facie* indicator that all the relevant entities were not considered during perplexity (Latour, 2004:105). When new entities demand their recognition, further "consultation" recognises these appeals and is the second feature of the power to take into account (Latour, 2004:106).

Consultation, therefore, requires that the entities not be "arbitrarily short-circuited" when determining facts and ensures the recognition of new entities (Latour, 2004:106). Collectively, perplexity and consultation, therefore, form the power to take into account.

While perplexity accounts for the number of entities, consultation considers the quality of the entities to be taken into account (Latour, 2004:108). "Hierarchization" recognises the quality of the entities by positioning the existing and newly included entities in relation to one another (Latour, 2004:107). Latour (2004:107) considers this process to be similar to the Kyoto conference, which he argues had to determine the significance of the global climate to that of the American economy.[40] Once the process of hierarchisation has taken place, Latour (2004:109) requires that all entities be recognised in terms thereof, forming an "institution" which recognises entities in accordance with their "legitimate presence at the heart of collective life".

The power to take into account concerns itself with identifying entities excluded from the collective through the features of perplexity and consultation. In contrast, perplexity is the inverse of institution – perplexity opens the recognition of all entities while 'institution' brings that recognition to a close. In combination with hierarchisation, institution forms the power to arrange in rank order.

While the unqualified Nature/Culture distinction of the Moderns required that the Fact/Value binary conforms to it, the opportunity now exists to recognise excluded entities by extending the binary to a fourfold structure. This process ultimately allows for the engagement of a collective which is further considered in the following section (4.3) (Latour, 2004:129). From this new position, Latour (2004:128) also considers his metaphysics. Latour recognises that the absolutist knowledge claims usually associated with metaphysics can be inversed, transforming the field from one of "Absolute Science and Power Politics" to a "guarantor of our basic ignorance" (cited by Harman, 2014:65). Characterised as such, metaphysics becomes a process of recognising entities and forming a collective – the same task of political ecology (Harman, 2014:65). While the Modern Constitution characterised ecology as groups of hybrids requiring purification and categorisation in terms of the Nature/Culture divide, the new structure provides the opportunity for the recognition of all the entities involved (Latour, 2004:129).

From this quartered division of the Fact/Value binary, Latour considers its contribution to the Economic Sciences. Fundamentally, Latour (2005:135) argues that the Economic Sciences, being entrenched within the Fact/Value split, fail "to dissimulate the search for values under already-established facts, and the search for facts under already-established values". Latour

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[40] The Kyoto Conference, or the "Third Conference of Parties to the Framework Convention on Climate Change" was held in Kyoto, Japan during 1997 "as the most authoritative analysis of climate change" of the time (Bolin, 1998:330).

(2005:135, 2013:29) therefore argues that the Economic Sciences exploits the Fact/Value distinction by using the limitations of each of the poles in asserting its position. Doing so fails to accurately account for economies since entities are not adequately recognised therein, ultimately undermining the power to take into account. Latour identified the parallels of the fourfold structure to the Economic Sciences as well. Latour (2004:132) notices how Economics also:

> "…seeks to take into account the elements that it has to internalize in its calculations; it too wants to establish a hierarchy of solutions, in order to discover the optimum in its allocation of resources; it too speaks of autonomy and freedom; it too manages to produce an exterior, that of the elements that it has provisionally thrown out of its calculations: elements that it has precisely, in its own terms, 'externalized'".

Considering the fourfold structure in this light, Latour (2004:132) reflects on whether the Economic Sciences allow "rational calculations regarding all associations of people and things". To undertake such 'rational calculations', the collective processes of perplexity and consultation followed by hierarchisation and institution would need to take place to recognise entities not included within the Fact/Value binary. However, upon situating the Economic Sciences within the fourfold structure proposed by Latour (2004:134), it becomes clear that the field does not recognise all the entities required by perplexity or undertake the process of consultation. Consequently, Latour argues that the Economic Sciences fails to transcend the Nature/Culture binary (Latour, 2004:131).

In Chapter Three, Callon (1998b:259) suggests an approach to calculate externalities. Callon (1998b:247) also explains that externalities prove inefficiencies within markets, which the Neoclassical model assumes. To calculate the possible impact of an externality and therewith the extent of its economic impact, the necessary 'facts' which follow from "measuring instruments for quantifying and comparing" externalities by uncovering links and new actants need to be allocated a 'value'.

The fields of Environmental Law and Sustainable Development, for example, recognise this distinction in referring to either anthropocentric or ecocentric approaches (Imran *et al.*, 2014:134; Kidd, 2011:1–19). For Latour (2004:131), the terms 'ecosystem', 'nature' and 'environment' fundamentally still classify entities based on the Modern Constitution's distinction. An 'ecosystem' merely resituates all entities within the nature pole of the binary by disregarding the characteristics associated with the culture pole (Latour, 2004:131). Although an 'ecosystem' recognises all entities within, the integration does not allow for due process in its characterisation (Latour, 2004:131).

The Modern Constitution's binary extends further than the distinctions within 'ecology' and 'ecosystem', within the Economic Sciences. Latour (2004:132) recognises that the Economic

Sciences face the same dilemma of characterisation as ecologism but, rather than situating all entities within nature, the Economic Sciences "purports to assume all the functions of the collective without paying either the political or scientific price" (Latour, 2004:132). The Economic Sciences adhere to the Modern Constitution as it groups according to the Modern Constitution's divide. Entities are separated into "'producers,' 'consumers,' and 'goods'" but at the same time, are allowed to play a double game with the Fact/Value distinction (Latour, 2004:132). To such an extent, Latour (2004:134) argues that the field "exploits to the maximum the fundamental ambiguity of facts and values".

While the Fact/Value binary fails to recognise all entities, the processes of perplexity and consultation followed by hierarchisation and institution allow for the recognition of a new collective which includes entities from both poles of the Nature/Culture divide (Latour, 2004:127). While purporting to recognise all entities in making 'rational calculations', the Economic Sciences do not undertake any of the four processes. Latour (2004:134) reasons that the Economic Sciences are not concerned with perplexity, as it "does not have time to be descriptive" but also not with consultation which would not "produce the optimum" when considering all entities (Latour, 2004:134). It would seem that the Economic Sciences are more interested in maintaining the status quo, particularly because the existing approach has been so beneficial to the upper tiers of businesses, rather than radically evaluating the flaws of the system. While this re-evaluation could help economies overall, it will certainly result in a redistribution that negatively impacts those upper tiers from the continued profits their approaches generate in externalising entities. All of this is to say, perhaps there are outside, profit-motivated reasons for the reticence.

Nonetheless, the Economic Sciences contend that it is concerned with determining facts, by way of the scientific process; concurrently, the Economic Sciences are concerned with determining value but only undertake negotiation when it is "limited to the calculus" (Latour, 2004:134). Essentially, the Economic Sciences attempt to assess value from "already-established facts" while simultaneously attempting to discover facts from "already-calculated values" (Latour, 2004:135).

What is essential for this dissertation is that the concerns of fact and value within the Economic Sciences can be resolved by applying the four processes and in the following section (4.3) some existing examples in equity markets are considered in light of Latour's ecological focus. For Latour (2004:135), if the Economic Sciences were to consider perplexity and consultation, the field would improve its "capacities for representation". Simultaneously, if the Economic Sciences would undertake a process of hierarchising entities, the continued discrepancies faced between facts and values would also be addressed (Latour, 2004:135). These processes reprioritise Economics from its double game to focussing on recognising and quantifying relations between entities

(Latour, 2004:135). Economics, therefore, also becomes “performative” in the sense that it is a process to be undertaken and not the “infrastructure of societies” (Latour, 2004:240). This reshaped role of economists, along with three other professions further characterise Latour’s (2004:136) collective.

In addition to economists, Latour further develops the fourfold structure through the introduction of the following three professions: scientists, moralists, and politicians. Each of these four professions, in turn, correspond with one of the four processes: perplexity, consultation, hierarchisation, and institution (Latour, 2004:162). Scientists, who discover new entities, correspond to perplexity; moralists then undertake consultation when discovered entities are considered in light of the existing collective. To order the new collective, politicians perform hierarchisation, and finally, economists tie the entities together in a stabilised collective through an institution. Additionally, each of the professions partakes in all the other processes, preventing a taxonomical rift as developed within the Nature/Culture distinction (Latour, 2004:234). Besides partaking in each of the other processes, the four professions must undertake two additional tasks: the “separation of powers” and the “scenarization of the whole” (Latour, 2004:155). The separation of powers requires the isolation of the four processes to ensure each process’ autonomy and the scenarisation of the whole forces each of the four professions to bring consistency to the description.

Alongside the separation of powers and the scenarisation of the whole, the four processes and their corresponding professions form the collective, but one final process and corresponding profession is required to ensure its continuation for Latour (2004:180–183). Latour (2004:207) posits that this process is performed by an “administrator”, which corresponds with the “power to follow through”. The task of the administrator is to isolate entities from the collective which are deemed “*for the time being as incompatible* with the common world” (Latour, 2004:179). Entities are not removed from existence by the administrator, but as long as the entity opposes the collective, it is excluded from it (Latour, 2004:179). Notably, Harman (2014:67) recognises that Latour’s collective bypasses the concept of an exterior and can consequently “avoid the Power Politics he inherited from Hobbes”. As discussed, Latour’s processes continually recognise entities that had previously been excluded from the collective, therefore understanding the external as it comes into view (Latour, 2004:186).

The formation of the collective introduces a concept important within Latour’s political philosophy, the “notion of politics as a loop” (Harman, 2014:78). As mentioned above, “the power to take into account” and “the power to arrange in rank order” form the upper and lower houses of Latour’s (2004:234) politics. Entities continually transcend and are isolated from the upper house, causing a loop of recognition. Comparatively and contrariwise, the Modern Constitution recognises time

as linear based on development, therefore when entities are no longer relevant according to the Modern Constitution, they are omitted infinitely (Latour, 2004:189).

Latour, however, allows for these entities to be re-recognised within the upper house by characterising time based on the recognition of excluded entities rather than their omission. Therefore, the identification and disregard of entities characterise time; its passage becomes clear when "*two successive iterations"* of an entity are juxtaposed "and no longer by way of the old distinction between facts and values" (Latour, 2004:191). Latour (2017:49) suggests that rather than distinguishing between facts and values, one should consider that facts mandate a specific reaction which influence facts and mandate other reactions. The analysis of facts, in this sense, becomes performative, as the facts oblige a specific reaction, or interrelated value (Latour, 2017:48). Latour (2017:49) suggests that humanity must "become accustomed to a *continuous linkage* of actions that *begin* with facts that *are extended* into a warning and that *point* toward decisions", disregarding axiological neutrality in the process.

What is central to this dissertation is the point that "axiological neutrality" is impossible according to this approach because the relation of entities can no longer be measured against a benchmark of what is "natural" (Latour, 2017:22). Latour (2017:20) suggests this point when considering the common use of the concept nature or natural law, which inherently proposes a "*normative dimension*". In this context, "nature becomes a synonym for 'moral', 'legal' and 'respectable'" but nature, as well as the other concepts listed, cannot be allocated specific meanings in "today's pluralistic society" (Latour, 2017:20). Besides emphasising the difficulty of the Nature/Culture split, this example shows that the distinction advocated by the Modern Constitution along the lines of different components and illustrates why Latour does not propose a 'return to nature', which the following section (4.3) will introduce, because the meaning of nature itself is plural and all claims to nature, are constructivist (Latour, 2017:21).

Before moving on, it is important to summarise what has been covered in this section. In sum, Latour doubles the Fact/Value distinction into four areas: perplexity, consultation, hierarchisation, and institution. To recognise new entities and reconsider the collective, perplexity identifies the entities which need to be considered in consultation, perplexity and consultation thereby forming the "power to take into account" (Latour, 2004:111). The "power to arrange in rank order" on the other hand, requires that the newly recognised entities be hierarchised, following which, institution concludes the inquiry (Latour, 2004:111). Although separate, each of these four areas participate in the processes of one another through the "separation of powers" which is brought into concert by the "scenarization of the whole" (Latour, 2004:155). Finally, the "power to follow through" recognises and excludes entities which are contrary to the formed collective.

This dissertation is concerned with bringing Latour's critique of value into the realm of equity markets and of particular importance for our present study is the characterisation of the environment. This section has plotted what Latour (2017:27) suggests when stating that climate experts "had crossed the yellow line between facts and values". Criticised by actors who are confined in the Modern Constitution's distinction, climatologists were notified that "the facts *aren't there*, whether you like it or not". As this section has highlighted, the fact forming process of climate experts had taken place by discussions founded in "twenty years of documentation, and an estimated degree of certainty close to 98 percent" (Latour, 2017:27). But in providing facts, the climatologists need to recognise that they also have politics, but doing so should "not cast the slightest shadow of doubt on the quality, the objectivity, or the solidity of the scientific disciplines" (Latour, 2017:33). The following section (4.3) considers these 'facts' as applied within equity markets but, because of this dissertation's environmental focus, Latour's ecological conceptions are unpacked first.

4.3 Latour's Political Ecology and its importance for equity markets

As the previous section (4.2) illustrated, Latour (2017:26) argues that the interplay of facts and values were exploited by "industrialists and financiers" through the creation of doubt and alternative approaches to the 'facts' of the climate's condition. Essentially, Latour (2017:26) argues that the industrialists and the financiers disputed the 'facts' of the climate as it allowed them to further benefit from the climate's exploitation. As soon as the 'facts' were no longer disputed, an appropriate reaction or a set of "moral implications" regarding the environment is implied and then manifested, in the form of policies, laws, and other measures (Latour, 2017:26). Besides highlighting the interrelatedness of facts and values, Latour's (2017:34) approach puts emphasis on how "a matter of fact is *necessarily* also a matter of law", from the perspective of the Modern Constitution, this creates an opposition of "*two moralities instead of one*" by referring to what *is* and what *should be* as discussed in the previous section (4.2).

For Latour (2017:3), the "present situation" facing the earth only serves to emphasise how the Modern Constitution is increasingly obsolete and perpetuating the climate crisis. In considering humanity's drive towards progress at the expense of the environment, Latour (2017:12) argues that the continuation of the Modern Constitution's approach to nature, which sees it as an increasingly unmanageable mechanistic system, requires further control as if it had not been controlled "completely enough" (Latour, 2017:12).

As Chapter Two emphasised with the Modern Constitution's crisis in 1989, the Moderns continue to weigh in on the culture pole of the binary. Fundamentally, an urge for the total domination of nature has followed from the Modern Constitution's approach, the logic of which would ask, if

“Modernisation has led us into an impasse? Let’s be even more resolutely modern” (Latour, 2017:12). The Moderns’ approach, Latour (2017:192) suggests, has “unplugged” humanity from reacting to concerns of the climate and for constituents of the Modern Constitution, the climate is not connected to them in their drive to progress. Latour (2017:15) therefore suggests that the binary of the Modern Constitution, eliminates any attempt to bridge the gap between nature and humanity. For the Moderns, any revision of nature is interpreted as a return to a period before humanity, before the Moderns and before their progress (Latour, 2017:15).

This section briefly outlines three important considerations for this revision and two accompanying critiques which it then applies to the equity market bringing the diacritical hermeneutical method to fruition.[41] In what follows directly below, it will become clear that the refusal of the Moderns to disregard the Modern Constitution consequently excludes any reorganisation of the Nature/Culture binary, while Latour (2017:19) re-establishes humans as part of a collective. The diacritical hermeneutics applied in this dissertation, however, allows for dialogue and connection between the two while plotting their development in the prior chapters, and now bringing the narratives into praxis in the final portions of this section.

Latour (2007:249) navigates this collective through his conception of a political ecology. Political ecology, for Latour (2007:249), is “an alternative to modernization” which requires the disregard of the Modern Constitution’s divide. As reward, the conception manages the new-found collective of humans and non-humans (Latour, 2007:249).

As a first consideration, Latour (2017:14) suggests that the word ‘ecology’ has developed as an effect of humanity’s alteration to how it relates to the world, merely speaking of the relation, itself implies humanity’s alienation from nature. The practice is well entrenched and Latour (2017:14) recognises the longstanding western tradition for humans to distinguish themselves from nature, as clearly illustrated in the definitions of “‘culture,’ ‘society,’ or ‘civilisation’” which each prove to emphasise the distinction. Definitions of nature, on the other hand, are commonly interpreted from this same distinction for Latour (2017:16). Latour (2017:85) suggests that this state of events is an example of Whitehead’s (1920) “*bifurcation of nature*” where autonomy and action are only attributed to a portion of the world, echoing the Modern Constitution. Instead, Latour (2017:19) proposes that both nature and culture no longer be distinguished, as autonomy and action exist

[41] Latour (2017:146–182) provides a number of requirements to “convene the various peoples (of Nature)”. The relation of humanity to the world, the recognition of entities in the world and the interactions between entities are the three most relevant for defining the collective in this dissertation.

on both sides of the divide. As an alternative, “Nature/Culture” is proposed to be utilised as a first step in no longer differentiating between the two terms (Latour, 2017:19).

Considering ecology in this light forces a revaluation of humanity’s relation to nature (Latour, 2017:19). Nature and culture are “the same concept consisting of two parts” and are not divided into two separate environments (Latour, 2017:20). As with Actor-Network Theory, the disregard of the Moderns’ approach allows Latour (2017:22) to identify the commonalities between the two parts and provide a new method of navigating the collective where entities can “speak for themselves”.

The second consideration for this dissertation is Latour’s (2017:37) understanding of the term “world”, which he requires to remain open enough to recognise new entities and “other arrangements” as was illustrated in considering Latour’s considerations of facts and values in the previous section (4.2). Latour (2017:135) emphasises that his approach does not replace entities but suggests that recognising the connections between entities can then collectively form a system. As in Actor-Network Theory, a system with more connections, and the ability to create more thereof, would then prove stronger to others (Latour, 2017:135–136).

The existence of entities, unlike the Modern Constitution, is expressed by their actions (Latour, 2017:70). Latour (2017:69) proposes that actions and their effects can be traced to “deduce the consequences from the cause” in forming a narrative. The actors which constitute the narrative consequently come to the fore through their actions (Latour, 2017:89). In addition to the actors themselves, their characteristics become known from their actions, which must always remain open for revision (Latour, 2017:90). The characteristics of opposing entities also come to the fore in this process as the opposition of actors by others allows for their recognition, but also to trace the actor’s impact on other actors and their territory (Latour, 2017:263). Collectively, entities can then be traced to come into being through their significations, as now manifested in the actions of actants and actors (Latour, 2017:70).

The third consideration comes most prominently to the fore while contrasting Smith and Hume’s conceptions of the world (see Hume, [1740]2003; Smith, [1776]1976). As developed in Chapter Two, Smith supports the mechanistic conception of the world in line with Latour’s description of the Moderns, while Hume proposed an approach that focussed on the creation of order through individual actants that collectively formed independent systems. In citing Lovelock, Latour (2017:98) suggests that actors and actants alter their environments for their own interest while also having to adapt. This approach allows for the recognition of the diaspora of agencies which each modify and alter the agencies of others, collectively forming the “distributed intentionality” of actors (Latour, 2017:98).

While Smith's isolationist conception recognised nature as static, by allowing for the re-calibration of the scale of agents and agency, Latour's work recognises "waves of action" without suggesting the existence of 'social forces' (Latour, 2017:104). The distributed intentionality of Latour is also a critical point in responding to the critique raised by Harman (2014:60) above, regarding anthropomorphism and Actor-Network Theory. Latour (2017:99) suggests that, in following his approach, humans and all other organisms, "rearrange everything around themselves" to their benefit. As an effect, entities cannot remain passive as intervening entities alter and change one another (Latour, 2017:99). Given the fact that agency is distributed beyond humans, other agents are recognised in the "non-intentional retroactions" which follow from the actions of humanity which are intended on shaping the world to its benefit (Latour, 2017:99).

The three considerations above bring the world into consultation with humanity (Latour, 2017:73). The approach emphasises "a material world subjected to a strict linking of causalities, as opposed to another world – human, symbolic, subjective, cultural" (Latour, 2017:69). However, the consideration of this new world can only be "a fiction" (Latour, 2017:263). The recognition of entities according to Latour's collective will always remain unrestrained as entities continue to demand their recognition. Crucially, Latour (2017:273) also does not propose that this fiction would give nature its own voice but that a human voice, which can be appreciated by other humans, could represent nature. Humans, therefore, gain the responsibility. Critically, Latour (2017:273) states that:

> "The error does not lie in claiming to represent nonhumans; we do that in any case all the time when we talk about rivers, voyages, the future, the past, States, the Law, or God. The error would lie in believing it possible to take such interests into account without a human who embodies, *personifies, authorizes, represents* their interests".

In having this representation, nature can be more adequately understood, recognised and articulated, its properties more adequately traced, and importantly, disallow its appropriation by having it "seized as property" (Latour, 2017:274). In sum, Latour's (2017:276) approach mandates humanity to recognise the reactions on human actions, which continually plot the properties and boundaries of non-human entities. Consequently, a 'fiction' allows for the recognition of the role of actants which had been crowded out of the debate, especially in climate change (Latour, 2017:263). For the Moderns, actants could only be recognised through statistics and data while Latour's approach places actants on equal footing and allows for a comparative to develop. Rather than the disassociation of the Moderns, Latour's (2017:263) approach would allow equity between parties.

The key factor of Latour's approach for this dissertation is its contribution to reconsidering the equity market. Insofar as it relates to economic theory, two main criticisms surface. Firstly, in citing Lovelock, Latour (2017:103) contends that economic theory spilled over into biology in

distinguishing agents and the relationships between them as always consisting of weigh-ups between the "selfish individual and the integrated system". As with other concepts prone to this presupposition, like "Nature, Earth, the Global, Capitalism or God", for Economics, "the Market, always with a capital M, could also serve as the authority of last resort over vast territories" (Latour, 2017:153). Contrariwise, in considering the relation of entities to collectives, Latour's (2017:135) proposition does not suggest the creation of an entity exalted above others.

The second main critique, Latour (2017:103) argues, is that insufficient attention is provided to the dynamics between actors due to the economic preoccupation of calculating "viability" through the externalisation of all agents in the environment of a specific actor. Latour (2017:103–104) proposes that any calculations done in this fashion function only insofar as the principles of accounting succeed in making the calculations viable. The approach creates an accounting system that becomes performative in determining which aspects should be accounted for within a calculation because, in excluding the system "it would be impossible to calculate profit and even more so to detach profit from its so-called environment" (Latour, 2017:104).

The process, for Latour (2017:151), ineffectively allocates and articulates the relations between entities, skewing relations between collectives as an effect. In the Third Chapter, these skewed relations were also articulated by Callon as externalities. Unlike Neoclassical Economics which considers economies as "closed systems", Latour (2017:271) does not propose that this approach implies a reorientation towards a totality or a zero-sum world, as understood in the Economic Sciences, but rather that the "*calculated negligence*" of the Economic Sciences misrepresent this relation (Marinescu, 2016:48). As discussed within Chapter Three, clearly the "concept of externality is effectively central both to economies and to economics" and, while unrecognised in Neoclassical Economics, externalities can signify the unrecognised entities therein (Callon, 1998b:244). Allowing externalised entities to be recognised, Latour (2004:227) contends, would "identify the new rifts, the new enemies, the new fronts" facing his political ecology.

The exclusionary approach of Economics is well-defined in considering *Homo Oeconomicus* for Latour (2017:107), who suggests that Economics has reduced humanity to

> "a very small number of intellectual competences, endowed with brains capable of making simple calculations of capitalization and consumption, to whom we attribute a very small number of desires and who have finally been persuaded to view themselves as individuals, in the atomic sense of the world".

In opposition to *Homo Oeconomicus*, Latour's (2017:139) approach aims at having humans recognise their situatedness within the world and, through the recognition of this fact, the value of our actions. The recognition of one's actions and the consequences thereof requires a revaluation of existing concerns and collectives (Latour, 2017:141). The approach requires a re-

evaluation of collectives in light of their agency and the re-evaluation is considered in the equity market in the remainder of this section.

A limitation that Latour (2017:260) identifies in the "Laws of the Market known to Economics" is that by guiding their relation, Economics is geared towards what humanity "consumes, produces, buys and sells", which is made clear when considering the Neoclassical Economic School's interpretation of utilitarianism as unpacked in the Second Chapter. Moreover, even if the focus of the Economic Sciences could be shifted, Latour (2017:260) highlights further that "from ten economists we can get fifteen contradictory pieces of advice". If not the Economic Sciences, the negotiation between the newfound entities and humanity should also not remain the priority of nation-states (Latour, 2017:271). Latour (2017:271) suggests that, as with the interests of *Homo Oeconomicus,* nation states follow exclusionary approaches that disregard that which is "outside" itself. Nation states' claims to total authority and sovereignty further dilute the opportunity to recognise the interconnectedness, which had already been entrenched during Mercantilism as the Second Chapter had discussed (Latour, 2017:278). Although not solely the role of the Economic Sciences, Latour's approach does provide interesting insights into articulating his collective therein.

The vast scope of networks produced by Actor-Network Theory recognises the intricacies of Latour's political ecology and emphasises the "complexities of environmental harm" but also the complexities in recognising externalities (Hetherington, 2019:334). As informed by Callon, the Third Chapter had stressed that Latour's approach requires extensive efforts to internalise entities and frame calculations widely. This section has emphasised how the Economic Sciences must "impose limitations, to add up calculations, and to internalise exchanges" (Callon & Latour, 1997:19). Without first framing, the internality of a calculation is unbounded, and not calculable for the Economic Sciences (Callon & Latour, 1997:6). However, this does not imply that the Economic Sciences are unable to reframe calculations. What the Second Chapter had illustrated, and the Third Chapter applied to Actor-Network Theory, is that the calculative processes of economic actors vary. The variance within the approaches of the calculative actors described underpin their variance in considering value (Doganova, 2019:260). The immense task underscores the volatility of markets as the calculative processes interact.

For the Neoclassical School of Economics, value is equated to the price of the object on the market (Bodie *et al.*, 2010:xv). Latour, on the other hand, unpacks the Fact/Value binary to reconstruct a collective which can more adequately recognise excluded entities, the fact forming process, and the influence of facts on values. When considering the models of the Economic Sciences in this light, it becomes clear that the models proposed would be unable to accurately account for all entities as the process followed is isolationist. Nonetheless, an Actor-Network

Theory account situates the valuation process within a network and can be used to uncover what the network values, rather than attempting to precisely articulate value (Doganova, 2019:261).[42] Latour's ecological focus, then, emphasises the ability for non-human entities to be included within existing, albeit framed, valuation processes. Latour's (2017:273) calls to have humanity act on behalf of other non-humans then provides an opportunity to reconsider the existing calculative methods to more accurately recognise entities that exist outside of the culture division of the Modern Constitution's binary by disregarding it entirely.

Within Ecological Economics, the concerns raised by Latour have also been articulated as a "story of an economic system premised on unconstrained growth embedded in a finite, encompassing ecosystem" (Pelletier, 2010:1893). Ecological Economics, which the Second and Third Chapters considered, developed as an approach to address the inability of Neoclassical Economics to correctly weigh and ensure an "environmentally sustainable mode of economic organisation" (Pelletier, 2010:1887).

As a foundational approach in Ecological Economics, Pelletier (2010:1893) suggests the "interlinked human and non-human natural communities" be recognised. Proponents within Ecological Economics characterise economic actors as both the "relevant human *and non-human natural* communities which they mutually constitute" (Pelletier, 2010:1890). Voices in Sustainable Development echo this approach and suggest that its terminology be reinterpreted to allow for "a more holistic and ecocentric flavor" (Imran *et al.*, 2014:141). Although these economic solutions are not new, the work of Latour provides a philosophical basis and allows for the greater understanding and development of the parallels between these approaches. Many ancient philosophies, like the Stoics or the Confucians, measured the moral maturity of their civilisations based on their ability to recognise moral claims from external groups (Brennan, 1995:2). While groups could easily recognise the moral care of their families and communities, it was common that the same groups struggled to find similar foundations to extend this care beyond their communities (Brennan, 1995:2).

Latour provides a perspective on the existing calculative methods employed by markets and emphasises how calculative methods will inherently have externalities. Beyond this critique, Latour also provides a set of professions and processes to recognise excluded entities and better include them within our calculative methods. Existing market approaches that move towards this

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[42] In reconsidering valuation in light of climate change and sustainable development, Doganova (2019:261) also identifies two main concerns insofar as it relates to an Actor-Network Theory perspective. Firstly, an assortment of valuation devices exists, each of which suggest an alternative measure for valuation and secondly, valuations take place from economic platforms which hinder the recognition of all the entities (Doganova, 2019:261).

incorporation, like Sustainable and Responsible Investment, then partly articulate Latour's philosophy as it mandates humanity recognise its impact and influence on other entities. Applying Latour's approach within equity markets implies the creation of a greater space for externalities to be recognised within the market. Specifically, within equity markets, Sustainable and Responsible Investment approaches move towards fulfilling the role of recognising the Environmental, Governance, and Social factors that the Neoclassical models fail to recognise (Giamporcaro, 2011:121). The approach utilised by Latour can therefore be supported by existing Sustainable and Responsible Investment methods. The convergence of Latour and Sustainable and Responsible Investment then further critiques the Neoclassical School of Economics. Beyond reiterating the limitations in the calculative processes of the Neoclassical School, Latour's philosophy recognises that the inclusion of all entities within calculative methods is unachievable. However, through the processes and professions Latour provides, entities can be recognised and more adequately reflected within existing calculative processes.

In bridging Latour's contributions with the Neoclassical School of Economics, these approaches do propose a limited method of valuing the environment and do allow for a more representative consideration of the environment in economic units that policymakers and the public can consider (Pearce, 1992:8). Applying Latour's approach then underscores the need for the incorporation of Environmental, Social and Governance Factors in equity markets and recognises the extension of existing methods of framing within economic calculations. While remaining a fiction, more approaches to value allow for better management of limited resources and better governance and strategy (Arvidsson, 2009:97). The approach necessitates the "correct pricing of goods and resources, better appraisal of capital investments" and "redesigning the presentation of statistics about economic progress" (Pearce, 1992:12). The Economic Sciences' "incapacity to make predictions and to calculate" can now be recognised with due acknowledgement of its limits, as by the very limits that it makes use of allows the science to calculate (Callon & Latour, 1997:19).

Latour's philosophy shows that externalities and entities which demand attention can be included within existing asset management metrics despite the characterisations of the Neoclassical Economic School. The Social component of Sustainable and Responsible Investment now becomes extended to consider entities beyond the culture divide of the Modern Constitution. Situating Sustainable and Responsible Investment approaches within markets, our diacritical investigation of Latour and Neoclassical Economics has recognised a framework for the calculation and incorporation of Environmental, Social and Governance Factors. In practice, Contemporary Equity Markets have seen the development of rating systems that specialise in calculating the Environmental, Social, and Governance responsibilities of listed companies (Giamporcaro, 2011:121).

The application of Sustainable and Responsible Investment's quantification of externalities then becomes a method to bring the non-human entities to the trading room and allow their recognition. This dissertation also recognises that externalities cannot wholeheartedly be included within calculations but by continually recognising entities as they demand the recognition of their existence we extend our measurements. Ecological Economics also recognises this feat as "there is a need here for on-going development of the epistemological and ontological foundations" which it considers (Pelletier, 2010:1983). Recognising that Latour's (2017:263) proposition will remain "a fiction", also poses difficulties in considering how the diacritical hermeneutical method of this dissertation is only brought to fruition as applied. Nonetheless, existing parallels between Latour's contributions and Sustainable and Responsible Investment approaches are brought into praxis by positioning Latour's approach in the market.

For Latour (2007:249), environmentalism is "on track for rapid integration into people's everyday concerns" which sees "the defence and protection of the environment becoming a feature of everyday life, rules, regulations and government policy". Banking and financial sectors' public reputations have soured as perspectives on the moral and ethical practices of the environment have changed following the 2008 market crash (Owens, 2012:143). Fortunately, confidence in financial institutions correlate to the strength of the economy, and by re-evaluating how the economy is managed, market confidence can be improved (Owens, 2012:160). Latour's suggestion seems all the more likely in this light as within equity markets, "Sustainable funds attracted record inflows in the first quarter amid the market turmoil" caused by the Coronavirus (Stevens, 2020). Finance may become "a powerful tool we can use for the public good" (IMF, 2012).

4.4 Conclusion

The initial portions of this Chapter sought to plot Latour's unique understanding of value. Following Latour's 'centres of calculation', Latour considers value from a fourfold approach which illustrates the distinction between facts and values of the Modern Constitution and the Economic Sciences. Latour further employs a set of professions to form a new collective which emphasises the interconnection between facts and values.

Now reinforced, Latour (2017:3) reiterates that the continued distinction of the Modern Constitution between nature and culture has perpetuated the ongoing environmental degradation which has thus far accompanied the Moderns' sense of progress. As an alternative thereto, Latour (2017:22) suggests that entities "speak 'for themselves'", thus transforming the concept of what is natural to mean what is "there, nothing more".

Ecology now transforms from the disruption of the distinction of the Moderns to an opportunity to identify “relations to the world”. In comparison to that of the Moderns, humanity should realise that it has become part of nature and that its interconnectedness with nature is inherent rather than identifying the crisis as a momentary passé or a task to be completed on the road to further progress. The ecological crisis is not something to be solved for Latour (2017:13) but an opportunity for “rethinking the idea of progress, *retrogressing*, discovering a different way of experiencing the passage of time”. Within equity markets, Latour’s approach mandates the recognition of humanity’s impact on other entities and the extension of our existing calcuative methods to more accurately reflect what we value. Following the initial impact of the Coronavirus, a similar opportunity to rethink what we value within markets is presented and supported in increased Sustainable and Responsible Investment sentiments.

Latour (2017:26) also recognises that the financial industry, in response to the climate threat, would face pressure because “the public was going to hold them responsible, and consequently would impose a profound transformation of the regulatory environment”. This Chapter further proposed Sustainable and Responsible Investment as one approach which could be used to incorporate Latour’s theory into contemporary equity markets.

Following the externalities which Chapter Three unearthed, the dialogue between Latour and the Neoclassical School emphasised the limitations of Sustainable and Responsible Investment which were echoed in Ecological Economics. While Chapter Three highlighted the need for the extension of our calculative methods, this Chapter plots a convergence between Latour and Sustainable and Responsible Investment as an approach which considers the extension of existing calculative methods. Beyond providing critique of the Neoclassical School, this chapter has shaped the nexus between Latour and Sustainable and Responsible Investment methods. The final Chapter will now briefly plot our route in reaching this point and conclude the dissertation.

CHAPTER 5

CONCLUSION

5.1 Introduction

Collectively, the first four Chapters of our present study have situated Latour's philosophy in contemporary equity markets. While we have not developed an alternative approach to value, we do find that Latour's philosophy accentuates the limitations of the Neoclassical School's calculative methods and supports Latour's proposal for the inclusion of 'the social' in equity markets. The presence of Latour's philosophy also provides new grounds for the consideration of value in equity markets. Beyond the Neoclassical understanding of value, we also considered existing applications in the market that were supported by Latour's philosophy in praxis. Latour's framing of Environmental, Social and Governance Factors then emphasised both the importance and the limitations of our existing equity market calculative methods.

This dissertation was initiated following the need for a foundational re-evaluation of the dominant economic understanding of value within stock markets (Gray, 2009:7). While South Africa's volatile markets during 2019 formed its backdrop, many international developments already reflected South Africa's position during this time. This state of affairs would only become more apparent following the initial spread of COVID-19. During June 2020, the outbreak has already had "clear significant economic impacts" which were mirrored in the "dramatic movements" of global financial markets (Zhang *et al.*, 2020).

It is a contentious topic whether ineffective valuations and estimations created these crises, or whether it is due to the breakdown of the models used in Economic Sciences which can no longer accurately account for developments within the market (Muniesa, 2012:27). These examples illustrate our economic models' treatment of the market, as found in the Neoclassical School, and raise demands on the nature of value and investment within equity markets (Callon, 1998a:2; Gippel, 2013:128; MacKenzie, 2006:6;21). Nonetheless, as the Second Chapter of this dissertation considered, economic theories have tended to focus on accounting and economic principles in ascribing value to our shares. Subsequent volatility in our equity markets has raised questions in the Economic Sciences' approach and highlighted the need for a philosophical re-evaluation (Callon, 1998a:2; Gippel, 2013:128; MacKenzie, 2006:6,21).

Opportunely, this dissertation aimed to reconsider the established approach to value in equity markets of the Neoclassical School of Economics by bringing it into diacritical reflection with

Latour's philosophy. This overarching goal was achieved by bearing in mind the following three research sub-objectives:

1. To bring the underpinnings and development of the Neoclassical School of Economics in diacritical relation to Latour.
2. To situate Latour within a market environment.
3. To describe the viability of Latour's ecological attitude when applied to the Neoclassical theory of value in equity markets.

To achieve these research objectives, the initial chapters of the dissertation utilised Kearney's (2011) diacritical hermeneutical method to reconsider the underpinnings of the Neoclassical characterisation of equity markets and the fundamentals that they hold concerning Latour. The dissertation then situated Latour in the market environment, bringing further meaning to light. Finally, the present study considered Latour's unique ecological approach and brought Latour's theory into praxis through existing Sustainable and Responsible Investment approaches in the equity market during the later Chapters. Each of these steps supports novel insights into the Neoclassical Economic School, which are concluded in the next section. Following this, possible future studies are considered.

5.2 The Neoclassical narrative in contrast with Latour

The Second Chapter of our research narrated the development of the Neoclassical School of Economics and reconsidered some of its aspects with Latour. As the Second Chapter emphasises, Latour's philosophy provides rich commentary and input as a critique to the Neoclassical School. This research allows for a review of Neoclassical Economics according to the work of Latour, which had not been developed prior thereto. The perception of the natural advance of human behaviour towards Capitalism, which later forms part of Adam Smith's understanding of trade, development and commerce was a significant theme in correlating the narrative to Latour. When unpacking this perception, it became clear that the belief in economic growth as natural and rational implies the contrary as well, and any behaviour which opposes the development of Capitalism is 'irrational' for Latour (2017:223).

The roots of the Neoclassical School also provided unique interconnections to Latour. For Aquinas, justice existed when the exchanged items had equal amounts of expenses and labour. The Second Chapter explains how this conception developed into the labour theory of value. Considering Latour in this light illustrates that the expenses in exchange cannot be calculated without first framing them, in turn, limiting justice.

Latour's philosophy also recontextualises trade during this period as, for the ancient Greeks, trade could also only be considered from a social perspective. Considering Latour's approach to the collective traced through Actor-Network Theory, Aristotle's justice in trade also rings truer than a more contemporary understanding of markets, and for both Latour and Aristotle, markets should be considered from a social perspective. Latour's approach recognises the opportunity for responsibility in trade, which can be achieved through the recognition and negotiation of all the relevant entities. The parallels between Latour's approach and that of the ancient Greeks, also extends to consider the subjectivity of economic value.

The rise of Feudalism in Europe during the 11th century signalled a shift away from the ancient Greek approach. The agrarian focus of the feudal lords emphasised the use of land for cultivation. Continued development required increased agricultural land ownership and increased production to further trade, which developed the wealth of the feudal lords owning the land (Fourie, 2020:103). Latour *et al.* (2018:591) identify the appropriation of land for commercial use as a lens to understand Capitalism. For this dissertation, the transition towards the use and appropriation of land for agricultural purposes plants the seeds of the exclusionary accounting procedures that Latour (2017:104) identifies to be so prevalent today.

Feudalism's increased focus on the acquisition of land for increases in production hints towards the contemporary, shared understanding of 'capital' as "an asset and hence work as a vehicle for economic power" (Muniesa, 2019:57). The feudal approach towards the earth is later reinforced by Locke ([1690]2015:46), who argues that the earth exists as a platform for the improvement of human life. Finally, Adam Smith concretises the distinction between nature and culture in the 1800s (Latour, 2004:272).

This dissertation traces the framework for Latour's (2017:8) critique that the 20th century's approach to the environment would "designate the beings of nature considered from afar, through the shelter of bay windows". As an alternative to the proposal initiated by Feudalism, Latour *et al.* (2018:591), in considering the work of Donna Haraway *et al.* (2016), supports a practice to "re-localise, to re-territorialise and re-earth" which Chapter Four had plotted. Unlike the Moderns, Latour (2011a:73–74) proposes that humanity recognises its interconnection and dependency on nature and "all become *peasants* again". Thereby, the approach of the feudalists in generating wealth and profit, in comparison, cannot account for its vast effects which Latour's proposition inverts by supporting the "inversion of materialism" initiated during Feudalism (Latour, 2017:104; Latour *et al.*, 2018:592).

The principle of justice in trade was nonetheless retained during Feudalism and continued until Mercantilism during the 16th century. Mercantilism also had an increased focus on the sovereignty

of nation-states and the protection of their wealth in precious metals. Through policies and laws, nation-states entrenched their "sovereign power of the Economy" (Latour, 2017:226). The Second Chapter had considered this development and, as the previous Chapter emphasises, the invulnerability of nation-states undermines the interconnectedness of entities (Latour, 2017:278). The sovereignty of nation-states also highlights the externalisation of our accounting practices and undermines the opportunity to hold nation-states to account as their accounting ledgers ineffectively recognise the externalities of their actions.

The Mercantilist understanding of value as consisting of precious metals, or Adam Smith's understanding of natural prices of commodities, contrasts with Latour's approach as well (see Smith, [1776]1976:85–88). For Latour, value remains socially determined but an Actor-Network Theory account can extend the number of entities which need consideration in determining value. Rather than the invisible hand of Smith, which guides the distribution of benefits among market participants, Latour's theory proffers that the market's participants can be extended to non-humans, emphasising a reconsideration of the benefits the market provides.

Use value, as articulated in the Second Chapter, can only be characterised according to increases in human utility and reaffirmed the incapability of the Neoclassical School to identify externalities, stressing the use of alternate methods in market environments. Importantly, Latour (2017:223) recognises that the weigh-up and identification of entities is impossible within the Modern Constitution, which disregards any actions which do not move towards progress. In Chapter Three, Actor-Network Theory reinforced the expression of externalities as Latour's Actor-Network Theory does not distinguish between human and non-human entities. Instead, Actor-Network Theory focusses on tracing connections between actors which in turn shape networks.

Framed as such Actor-Network Theory further holds that actors are not limited to humans. Traders, as well as the computer screens, equity shares, and equipment all collectively create networks. Actor-Network Theory allows for the categorisation of these impacts within a network according to the actors they influence and the subsequent actions taken by others (Hardie & Mackenzie, 2007:59). Collectively, Latour's contrast to the foundations of the Neoclassical School fortified the reasoning behind the development of the field of Ecological Economics in recognising the externalities of the closed Neoclassical Economic system. In light of Latour's political ecology, calculative methods which more adequately identify ecological matters can be represented.

This dissertation also considered one of these methods and, in praxis, the recognition of externalities becomes an ongoing matter as they come to the fore. In comparison to the Neoclassical economic model, Latour's approach critiques the understanding of a market as a

closed system from the foundation that calculations require framing to allow for them to take place in the first instance.

Within Ecological Economics, Nuppenau (2002:34) recognises that “the evaluation of nature can be predominantly described by assigning human-values to resources used by humans”, which often leads to the “over-exploitation of ecosystems”. In exploring a solution, Nuppenau (2002:34) suggests that nature and humanity could be considered “an exchange between ‘equal’ creatures”. Latour’s work supports this approach, proves that externalities are unbounded and emphasises that any attempt to form a collective, would necessarily need to remain open as these entities come to demand the recognition of their existence.

Latour’s approach also rationalises the recognition of entities as a construction, but it is no more a construction than the utilitarian *Homo Oeconomicus* of the market, and both can form part of the calculating agencies within markets (Callon & Latour, 1997:10). This theoretical approach allows for better recognition of humanity’s impact on its environment, and by giving voice to non-humans, these impacts can be better recognised within valuation.

Moving towards praxis, this research has framed the limitations of identifying environmental factors within calculative methods. Despite these limitations, the benefits of recognising human and non-human entities on equal footing allow for one approach which can better understand these externalities. The nature of actors is not fixed in Actor-Network Theory and the connections which they jointly constitute form the characteristics of an actor. Ecological Economics echoes this requirement as Pelletier (2010:1890) suggests that “the individual cannot be understood in isolation but, rather, is defined in relation to the organisms and processes which constitute its environment”.

While Actor-Network Theory has been critiqued for reaffirming the Neoclassical Economic model’s assumptions in its application, our present study has illustrated how a Latourian inquiry into the Neoclassical School’s understanding of value can provide unique insights (Lezaun, 2017:317–318). Although an alternative understanding of value is not developed in this dissertation, Latour’s approach emphasises the possible variation of existing calculative models to recognise impacts of non-human entities more appropriately.

While not developing a Latourian method for the equity market, our inquiry into value in equity markets has unpacked both the Neoclassical School and Latour’s understandings of value, and further navigated Sustainable and Responsible Investment as an existing approach which brings Latour’s philosophy to equity markets. Contrasting Latour and the Neoclassical School has reinforced existing flaws within the Neoclassical School and illustrated the perplexing approaches

of the market in determining value. Latour's unique insights into value further emphasised the need for alternative approaches and by applying a diacritical hermeneutical method, this dissertation has plotted the incorporation of Sustainable and Responsible Investment methods as an application of Latour's theory into praxis within equity markets. Accordingly, this dissertation has made a novel contribution by integrating the dissimilar narratives of Latour and the Neoclassical School of Economics through the diacritical hermeneutical method by extending this integrated approach to equity markets.

Following the initial impact of the Coronavirus, we have been provided with the unique opportunity to re-evaluate our understanding of our economies and reformulate what we consider valuable therein. The Coronavirus has poignantly restated existing issues within our economic methods which are now increasingly worthy of further research. This dissertation has considered Latour's contributions to this investigation and highlighted the need to increase the space provided to excluded entities within our existing calculative methods. Beyond this critique, Latour's philosophy highlights that our calculative methods will continually require reconsideration and variation, as new entities demand that their existence be recognised.

The Coronavirus has moved shareholders to increasingly focus on Sustainable and Responsible Investment approaches and, in light of Latour's contributions, this alteration illustrates an ongoing reformulation of what the market considers valuable to include entities which the Neoclassical School of Economics externalises. Conclusively, this outline contours our understanding of our calculative methods, our markets, and what we value therein. It fosters an innovative approach to equity markets and it promotes the extension of our calculative models to recognise undervalued entities in a time where their internalisation is more vital than ever before.

5.3 Future research

This dissertation has considered how Ecological Economics attempts to develop "a 'market' or exchange value for nature" and plotted how Latour's philosophy can support this development (Nuppenau, 2002:33–34). One significant area for future research is the juxtaposition of existing approaches of Ecological Economics and Latour to provide for further movement from praxis to practice in our equity markets. A possible doctoral study can consider plotting Latourian insights into existing Sustainable and Responsible Investment metrics and valuation methods practically. Additionally, such a study could weigh-up existing calculative methods within equity markets and consider possible legislative and policy approaches to further extend the recognition of non-human entities therein.

Some supplementary areas of future research are also uncovered by this dissertation. Firstly, this dissertation has emphasised the significant amount of studies which conceptualise financial markets as informed by Actor-Network Theory. Some alternative market places, on the other hand, focus on equity in trade similar to that of the Greco-Romans in the Second Chapter. These economic actors, which are not motivated by profit, recharacterise the entrepreneurship as motivated solely by "'for-profit-seeking' activities" (Benz, 2009:39).

Beyond providing unique comparisons to that of financial markets, by investigating the calculative agencies of these actors alternative attitudes to value may also come to the fore. The calculative methods of contemporary markets which are measured by metrics other than GDP can also provide unique contributions that are yet to be explored. Bhutan's multidimensional approach, for example, measures Gross National Happiness as an alternative to GDP and includes "ecological" factors therein (Ura *et al.*, 2012:1). Other approaches extend the metrics of GDP to recognise matters which GDP externalises, which "are long overdue" for panellists in the World Economic Forum (Clemens, 2020).

The Neoclassical understanding of investments and time is another area into which Latour's philosophy could provide unique insights given the differing approaches the Neoclassical School and Latour have towards it. Equally as important, Latour forces humanity to recognise the reactions of the environment created by humanity's actions which alludes to a reassessment of the Neoclassical concept of property ownership. Plotting Latour's approach in legislation may support exciting new approaches to legal personality and jurisprudence.

New Zealand's Whanganui river, for example, has recently been provided a 'voice' in human politics after it was recognised as a "…living entity and a legal person. Guardians uphold the river's environmental, social, cultural and economic well-being" through their appointed fiduciary duties, articulating an alternative approach towards sustainable economic development in the process (Argyrou & Hummels, 2019:752).

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