

Evolutionary Thinking in the Marketplace, Digital Markets, AI, and the Application of Competition Policy¹

~ By Donnavan-John Linley² (2025)

Introduction

The world is in constant flux and there is a sense of increasing uncertainty. Today's topical issues covering climate change, increasing geopolitical instability, a breakdown of global supply chains, and an "AI race" are some of the headlines driving this uncertainty. There is a saying, as clichéd as it may be, that "*change is the only constant*." It's my assertion that this is the truth of our reality on earth, and this simultaneously demands a way of thinking that aligns with this truth. Incorporating evolutionary thinking into the way the world works, which in itself is a complex system, and the corresponding marketplace covering the complexity of all our economic transactions, provides an essential frame of analysis. Evolutionary thinking in economics is not new, it was championed by evolutionary economists Thorstein Veblen, Friedrich von Hayek, Joseph Schumpeter in the first half of the 20th century. In today's world, evolutionary thinking is certainly of increasing importance, and it would make sense that it emerges from shadows of a relatively 'static' neoclassical thought to make sense of the world.

This paper is influenced by my observation of an ever-changing digital platform and AI ecosystem over the past four years. Following my work in the Competition Commission of South Africa's ("CCSAs") Online Intermediation Platform Market Inquiry ("OIPMI")³ and Media and Digital Platforms Market Inquiry ("MDPMI")⁴ I have observed significant changes in the products offered by tech companies, at an increasing rate of change. The Google Search page, for example, has evolved from a set of 10 fairly uniform blue links on the search engine results page ("SERP"); to a SERP with results of varying size, thumbnails and Google properties (e.g. YouTube, Shopping, People Also Ask); to having AI Overviews providing AI summaries on the SERP and the introduction of AI mode. In parallel Google introduced an adjacent personalised feed (with integrated search functionality) in the form Discover to take advantage of passive user engagement, complementing Google's Search ecosystem. This has coincided with the massive acceleration of AI since the launch of ChatGPT in November 2022. Technology has been propelled into an uncertain possibility space, where it is hard to tell what the tech landscape will look like, and what the predominant products and services will be in the next decade.

¹ This paper is the first draft of "*Evolutionary Thinking in the Marketplace, Digital Markets, AI, and the Application of Competition Policy*" for the 9th BRICS International Competition Conference and 19th Annual Conference on Competition Law, Economics and Policy held in Cape Town between 9 and 11 September 2025 on the theme "*Competition Law in Uncertain Times*".

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³ OIPMI. Available: <https://www.compcom.co.za/online-intermediation-platforms-market-inquiry/> [accessed 13 August 2025].

⁴ MDPMI. Available: <https://www.compcom.co.za/media-and-digital-platforms-market-inquiry/> [accessed 13 August 2025].

Evolutionary thinking challenges the mechanistic worldview of neoclassical economics, recasting the marketplace as a complex and dynamic system. This perspective highlights the importance of diversity and complexity for building a resilient economy, drawing parallels from biological symbiotic relationships to understand business interdependencies. The paper also examines the application of evolutionary thinking to digital market development, network effects, and the evolving frontier of the AI marketplace and AI capabilities. Evolutionary thought has important implications for competition policy, advocating for a forward-looking and dynamic assessment of markets, encouraging policies that promote diversity and inclusivity, and building resilience and adaptability into the marketplace .

Evolutionary thinking in the marketplace

Mechanistic vs an evolutionary approach

Traditionally, the view of economic systems has been particularly mechanistic⁵ influenced by Newtonian scientific thought⁶, where markets and economic forces can be seen as a set of components working together like cogs in a machine to make the whole function. This complete ‘whole’ is conceived as a big machine called ‘the marketplace’ or ‘the economy’⁷. In this Newtonian economy the notion of cause-and-effect is gospel. Here an outcome can be both explained and predicted by a neatly curated set of explanatory variables, bounded by informed assumptions and parameters, and packed in a sophisticated model of statistical significance. While these tools are important in helping our understanding, especially of some relationships, economics should attempt to be an accurate reflection of reality, an attempt to map and model a system that reflects the complex web of economic relationships and interactions, and the intuitive and counterintuitive dynamics of the marketplace. What is clear is that the marketplace is consistently evolving, a snapshot of it today will vary from a snapshot of it in the future. Evolution introduces further complexity in the system, fundamentally changing the structure and identity of economic actors of the marketplace⁸.

Evolutionary economics in complex systems⁹ provides a framework for analysis of the marketplace especially those that are complex and fast changing. This framework differs from “mechanical models” in that it presumes that predicting market outcomes is less predictable and deterministic given the market’s evolution and nuanced complexity¹⁰. In “mechanical models” a

⁵ Based on the author’s own observations.

⁶ Newton took a mechanistic view of how things worked, for example, he viewed the universe as a giant machine governed by physical laws, similar to how a clockmaker designs and builds a clock. See: Newtonian Worldview (2025). Open Library. Available: <https://ecampusontario.pressbooks.pub/introhps/chapter/chapter-9-newtonian-worldview/#:~:text=The%20position%20implicit%20in%20the,Newtonian%20communities%20accepted%20different%20theologies>. [accessed 12 August 2025].

⁷ For the purposes of this paper, ‘the economy’ and ‘the marketplace’ refer to the same thing.

⁸ This further complicates the predictability and corresponding parameters and explanatory variables of the marketplace.

⁹ Chaos theory also forms a part of understanding complex systems. It studies the behaviour of dynamical systems that are highly sensitive to initial conditions, leading to seemingly random and unpredictable outcomes.

¹⁰ This includes complex set of interrelationships and interdependencies between economic actors that change over time.

certain point will be true until some moment until there is an adaptation, innovation or a new behaviour that emerges. These changes can be brought on by external or “exogenous” changes, such as a black swan event or disturbances that affect the course of evolution. Alternatively, it is brought about by endogenous changes internal to the system or individual actors, which typically underpins evolving markets.

The distinction between “mechanical models” and complex systems are analogous to a Swiss Watch versus an ecological or biological system like a rainforest or the human brain. A Swiss Watch is an intricate piece made up of up to 400 parts operating harmoniously to serve its function. It is static machine, deterministic and can predict the time. Rainforests for example, represent an intricate set of organisms (e.g. plants and animals) living symbiotically with one another in a complex array of interrelationships and interdependencies. The rainforest is also influenced by the environment such as location, soil, and climate as well as exogenous shocks like deforestation.

Holism is an important aspect in understanding evolving markets, the notion that the whole is not like the sum of its parts¹¹, dispelling reductionist notions of the marketplace. Living systems cannot be described by such deterministic principles as physics or chemistry. Human thought, actions, and interactions are far harder to predict, we’re still trying to figure ourselves out. This extends to how humans organise themselves into firms and how firms themselves operate. Human systems are not “mechanical” except under conditions of regimentation and tyranny, however left to their own devices, freedom means that people perceive options, make choices and explore new possibilities. Furthermore, uncertainty is a part of the economic, social and political systems into which humans have evolved and is quite natural to us, it may even be what characterises the art of living.

The economy is not static but a self-organizing system where the future is fundamentally unpredictable and shaped by endogenous forces. This differs from traditional neoclassical economics which is built on the premise of rational actors operating in a system that tends towards a stable equilibrium. In contrast, evolutionary economics views the economy as a complex, dynamic system in constant flux, shaped by innovation, learning, selection and actors operating on their initial conditions and bounded rationality. From an evolutionary perspective, change is not a smooth, predictable process but rather a continuous cycle of variation, selection, and retention. In the context of economic actors, variation relates to firms, driven by a desire for profit or survival, introduce new products, processes, and organizational structures. Selection then determines which of the variations survive. This can be a messy, imperfect and path-dependent process. Firms will then retain successful routines, technologies, and institutions. These are passed on, often through imitation, mergers, or the establishment of new industry norms. This creates a new “path dependency” where past decisions and technological lock-ins can have a lasting impact until the market evolves again.

Furthermore, complex systems are characterised by non-linearity, meaning a small change can have a large unpredictable effect, it can have a negligible effect or expand an outcome into

¹¹ The concept of Holism was originally coined by South African statesman and philosopher General Jan Smuts. See: J.C. Smuts (1926). *Holism and Evolution*. N & S Press Cape Town (1987).

possibility space¹² with varying degrees of magnitude. Naturally, this makes it difficult for any model to predict a particular outcome and makes it difficult reduce the explainability of an outcome to a subset of variables. Rather the recent development of sophisticated AI models can both predict and shape outcomes ($\hat{y}$) but finds it difficult to explain how it got to the predicted outcome given the black box nature and general complexity of AI predictions¹³.

Path dependence might not necessarily mean that the strongest or best product or service endures. This is because path dependence is subject to other factors such as first mover advantage, initial conditions, firm behaviour, location, accessing to funding, skills and resources, finding sufficient demand for a product or service, and to an extent luck. Information and thus corresponding feedback can only come from paths actually taken. Essentially firms and individuals only grow and develop from the framework they inherit hence skills and values will automatically reflect the setting in which firms and individuals exist, so structure is locked into perceptions and values (Allen:1994)¹⁴. As patterns of technological change feed on themselves, re-enforcement results in growth or decline.

Transitioning to positive sum games

Overall positive sum games are a feature of evolutionary economics. This departs from a zero-sum mindset that is often prevalent in traditional economics which focuses on the efficient allocation of resources in the face of scarcity i.e. notion that when redistributing resources from A to B, one is depriving A in favour of B, where the total pool of resources remains fixed. Evolutionary economics involves itself with interrelationships and interdependencies of economic actors which can organise themselves and interact in way that creates synergies. Synergies create positive sum payoffs where the whole is greater than the sum of the interacting components and individual inputs. Innovation is also a positive sum spillover of synergy and so is value creation which fuels economic output.

Human life and the biosphere¹⁵ are good examples of positive sum outcomes, where life initially started as a unicellular organism¹⁶, evolved into multicellular organisms much later¹⁷ and then

¹² Allen (1994) explores systems with endogenous changes. For example, in biology, genetic mechanisms ensure that different possibilities are explored, and offspring spread out over time only by pure condition. In human systems, the imperfections and subjectivity of existence mean that techniques and behaviours are never passed on exactly, and that exploration and innovation are always present because of individuality and the contextual nature of experience. See Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

¹³ There are several forms explainable AI (XAI) that attempts to make AI system actions and decisions explainable and understandable.

¹⁴ Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

¹⁵ The biosphere is the worldwide sum of all ecosystems. It can also be termed the zone of life on the Earth.

¹⁶ Prokaryotes (a form of archaebacteria) were the first unicellular organisms on Earth from approximately 3.5 billion to 3.8 billion years ago.

¹⁷ Multicellular organisms are estimated to have formed around 600 to 700 million years ago.

into complex life forms¹⁸ into a diverse and complex biosphere¹⁹. Similarly, the economy is a complex system that mirrors the development of life on earth in many ways²⁰ like an increasingly noticeable positive sum dynamic. For example, renewable energy such as solar energy or nuclear fusion present opportunities to generate an abundance of energy without necessarily depleting resource stocks. Here it moves away from a zero-sum outcome²¹ to outcome of self-reliance, regeneration and abundance.

The diversity-complexity-resilience virtual cycle²²

In complex systems, focus should be on prioritising resilience which leaves some “slack” or redundancy to accommodate unexpected disturbances²³. Optimisation and efficiency work well in stable environments where disruptions are predictable and infrequent but can be prioritised slightly less in dynamic complex systems like the marketplace²⁴. Slightly smaller sandpiles²⁵ can be built, so it’s more resilient. Allen (1994) notes that the probability of being able to predict evolution and change in complex systems falls off the further one looks ahead²⁶, where short-term successes might equal long-term failures. Successful players have strategies that allow for adaptation and adjustment, where evolutionary dynamics selects for populations with the ability to learn than for populations with optimal but “fixed” behaviour.

The diversity of existence creates complexity and hence complexity feeds on itself²⁷. Thus, diversity and complexity are important components for evolution. Allen (1994) notes that diversity is absolutely vital to the functioning of a system as transactions can only occur if two actors are

¹⁸ The change from the first multicellular organisms to the complex life forms of today took place over a relatively short period of time (considering the change from unicellular to multicellular organisms took place over 3 billion years). The evolution into complex organisms is attributed to cellular specialization, sexual reproduction, and the evolution of cooperation. These advancements allowed for increased biological complexity and diversity, leading to the diversification of life forms seen today.

¹⁹ The author, Donnavan Linley’s premise.

²⁰ This is the author’s own premise.

²¹ Demis Hassabis (2025). Future of AI, Simulating Reality, Physics and Video Games | Lex Fridman Podcast #475. (1h12min). Transcript available: https://lexfridman.com/demis-hassabis-2-transcript/#chapter13_future_of_energy [accessed 8 August 2025].

²² The term “*diversity-complexity-resilience virtual cycle*” is coined by the author.

²³ See Holling, C. S. (1973). “Resilience and Stability of Ecological Systems.” Annual Review of Ecology and Systematics, 4, 1-23.

²⁴ Resilience involves building the capacity to cope with the unexpected and requires some degree of redundancy, diversity, and flexibility for adaptation and transformation. This can seem inefficient from a short-term, optimized perspective.

²⁵ In a sandpile model, grains of sand are added to a pile, and when the slope becomes too steep at a point, a toppling occurs (i.e. the critical point), and this potentially causes an avalanche of grains. Smaller sandpiles reduce the likelihood of toppling and an avalanche. The sandpile model embodies self-organisation criticality i.e. that the model moves to a critical state without external intervention. In financial markets, for example, each transaction is seen as a grain of sand but a buildup of these transactions lead to increased risk and instability in the system. Financial regulators, for example, try to curb systemic risk to prevent a “toppling” such as a financial crisis.

²⁶ Allen, P.M. 1994. Evolutionary Complex Systems: Models of Technology Change. In Evolutionary Economics and Chaos Theory. Pinter Publishers Ltd. (London). [Published 1994].

²⁷ Allen, P.M. 1994. Evolutionary Complex Systems: Models of Technology Change. In Evolutionary Economics and Chaos Theory. Pinter Publishers Ltd. (London). [Published 1994].

different²⁸. Diversity is the raw material for evolution, “*the variety pack of possibilities that allows life to adapt and persist in a changing world*”²⁹. In turn diversity boosts resilience³⁰ by providing flexibility and options when faced by stressors such as climate change, a changing geopolitical landscape, logistical disruption and increasing unpredictability. Here adopting a diversification strategy can help build resilience. Resilience building can be both an external and internal process, where the latter is strengthened by diversifying industry and building self-reliance. Diversity is the raw material for evolution, creating complexity which enables complex systems of resilience. Resilience is essential to a systems survival creating basis for evolution to perpetuate. This in turn reinforces even greater diversity and complexity³¹, creating a powerful, diversity-complexity-resilience self-reinforcing virtuous cycle like the biosphere (or the market economy).

Encouraging local freedoms

The local freedom of individuals and firms is also important for successful evolution where they are free to make their own economic choices without undue government interference. Allen (1994) notes that a successful and sustainable evolutionary system would be one where there is freedom for imagination and creativity to explore at the individual (*or firm*) level which seeks out complementarities and loops of positive feedback, providing stability and structure that humans (*or firms*) need to be a part of the community (*or economy*)³². Examples of local freedoms in the economic context includes the enforcement of property rights, the freedom to contract, voluntary exchanges (e.g. willing buyer, willing seller), the freedom to compete (i.e. the absence of unnecessary regulations and barriers to entry and expansion), and limited government intervention.

Local freedom sets up conditions that enable economic activity and eventual economic evolution. For example, it enables innovation where individuals and firms are free to experiment, take risks, and pursue new ideas without excessive burdens, thereby fostering the "variation" necessary for economic evolution. In the context of decentralised knowledge, economic freedom thrives on the idea that there are limitations to central authority decision making in that it cannot make efficient decisions for everyone. Rather, decentralised knowledge allows individuals and firms to rely on individual choices and market signals i.e. the ecosystem thrives off imperfection. In locally free economic environments, firms and individuals are more able to adapt and respond to changing market conditions, aligning with the evolutionary concept of "selection," where successful adaptations thrive and less successful ones to decline.

²⁸ Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

²⁹ Sustainability Directory (5 March 2025). Why Is Genetic Diversity Important for Resilience? Available: <https://climate.sustainability-directory.com/question/why-is-genetic-diversity-important-for-resilience/#:~:text=Fundamentals,persist%20in%20a%20changing%20world> [accessed 29 July 2025].

³⁰ Resilience is a system's ability to cope with disturbances and maintain its structure and function.

³¹ Adaptability also reinforces resilience. Adaptability is the evolutionary process by which firms become better suited to their environment and in the current business environment, one that is rapidly changing. This could lead to new innovations, processes and business models etc.

³² Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

Allen (1994) notes that the real complexity of the world involves the fact of collective structure, which is not amenable to any simplistic solution, be it central planning or the free markets³³. The notion that we can simply solve our problems by releasing the forces of the free market is an illusion. The market does not necessarily know best, as the existence of cycles of over and under-supply persist, and the real effects of speculation on asset prices such as spiralling house prices are often divorced from economic realities. Similarly, the central planner does not know due to the complexity of real interdependencies of individuals and firms, and an ever-changing marketplace. Therefore, a discerned practice of either free market or central planning / interventionist or non-interventionist approaches (or an appropriately balanced combination) should be applied to collective structures, often on a case-by-case basis.

Evolving from competition and 'error-making' to complementarity and cooperation

Allen (1994) notes that in the model of complex systems, competition helps to drive the exploration process into possibility space, such as the development of new markets, which in turn carries an element of 'error-making'. Both competition and 'error-making' drive evolution, which evolves to structures that express synergetic complementarities. Ultimately, the model of evolution tends towards cooperative structures^{34,35}, like those seen in symbiotic relationships. Free markets therefore are not just about competition but also about synergies. If competition alone dominated it would 'spread out', rather than build dense concentrations of people and activities. An economy therefore is a 'complex' of different activities and economic actors, some big and some small, that to some extent 'fit together' and need each other.

Interrelationships and interdependencies

An economic system is an interplay between a complex web of economic actors including individuals, firms, consumers, producers, intermediaries, distributors, agents, unions, associations, governments, regulators, academics etc. Evolution and nature can help us to understand the nature of relationships between these economic actors. These can be understood in biological symbiotic terms such as commensalism³⁶, mutualism³⁷ and parasitism³⁸. An analogous example of a mutualism would be the relationship between a digital platform and news media where news media receives sustainable levels of referral traffic from the digital platform, and the platform gets to surface news media results which is of interest to its

³³ Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

³⁴ Cooperation is not to be confused with anti-competitive collusion which manipulates and harms evolutionary processes which would have otherwise been driven by price competition and innovation. Rather, it refers to parties working together in a synergistic way to problem solve, innovate and create efficiencies.

³⁵ Cooperation played an important role for the emergence of human intelligence. Based on the 'social brain hypothesis', living in large, complex social groups required advanced cognitive abilities for navigating social dynamics, forming alliances, and understanding the intentions of others.

³⁶ Commensalism is a symbiotic relationship where one party is unharmed nor benefitted while another party benefits. For example, barnacle benefits from being on a whale but the whale is unaffected.

³⁷ Mutualism is a symbiotic relationship where both parties benefit from a relationship. For example, oxpeckers on large mammals, the oxpecker gets to eat, and the large mammal is simultaneously rid of parasites.

³⁸ Parasitism is a symbiotic relationship where one party benefits and the other is harmed. For example, a mosquito benefits by sucking blood and the human is harmed.

users. This changes when, for example, the platform uses news media content for its own AI summaries which benefits the platform as it attracts users, but it both competes with and deprives news media of sustainable referral traffic for monetisation, thereby harming the industry. This is consistent with parasitic relationships, where interactions benefit one party can harm the other.³⁹ Business relationships can be framed in the context of an array of interdependent relationships not too dissimilar to human relationships from healthy interdependence to unhealthy forms of co-dependence and various nuances in between⁴⁰.

Distribution channels feature prominently in marketplaces and the economic actors that control the major channels often carry some form of market power. Distribution channels demonstrate a form of interdependency between those who control the channel and those who need the channel access to sell goods and services to customers. In some cases, access to a channel could reap significant rewards, in other cases if the distribution channel is unavoidable, access or a lack thereof could make or break a healthy and efficient firm. Examples of key distribution channels include search for websites to be discovered (e.g. Google Search), a platform to book short-term travel accommodation (Booking.com), a physical store to buy goods (e.g. Checkers, Pick 'n Pay, etc.), a car dealership chain to sell competing car insurance products, etc.

Death and rebirth

From an evolutionary perspective, death (destruction) and rebirth (creation) are important aspect of the business and economic ecosystem. As with human life, this too is a part of the business life-cycle. This notion of death-rebirth is captured by Joseph Schumpeter's notion of '*creative destruction*' which he described as the "*process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.*"⁴¹ Pertinent to technological change, destruction refers to the failure and disappearance of outdated firms, technologies, business models, or industries. This is a part of the natural life-cycle of the business where failure of less-fit entities frees up resources such as labour, capital, physical assets, existing technologies to be used for new, more innovative purposes. Naturally, this excludes anti-competitive conduct, regulation or government intervention that prematurely destroys an otherwise healthy business or industry. Entrepreneurship, innovation, competition and capital drive creation of new innovations, products, services, business models, ways of organising etc. which in turn creates new types of jobs (requiring new skills), economic opportunities and growth. An example of creative destruction is the disappearance of video rental stores in favour of online video streaming services.

³⁹ In this context, however, interventions can be undertaken to ensure the survival of news media include assistance by digital platforms.

⁴⁰ Using the example used in this paragraph, digital platforms and news media can exhibit aspects of co-dependence where news media have no choice to depend on certain digital platforms as a critical source of referral traffic. In the MDPMI Provisional Report it was argued that news media often face a Hobson's Choice, where it had to give access to search engine bots to index links to their websites on the SERP, but this has also exposed their content to scrapping. In this relationship a power imbalance exists in favour of the larger digital platforms. See MDPMI Provisional Report. Available: <https://www.compcom.co.za/mdpmi/> [accessed 13 August 2025].

⁴¹ Kopp (2023). Creative Destruction: Out With the Old, in With the New. *Investopedia*. Available: <https://www.investopedia.com/terms/c/creativedestruction.asp> [accessed 11 August 2025].

Evolutionary thinking in digital markets

Digital markets experience network effects, where more users on the one side of the platform of a two-sided platform becomes more attractive to businesses on the other side of the platform. This positive feedback loop makes it harder for there to be numerous platforms in a given platform market as businesses would be attracted to those platforms that can reach the most consumers, thereby reinforcing stronger networks. Users can single-home or multi-home but typically don't use more than 2 or 3 platforms for a particular online market⁴². The limitations of user behaviour and corresponding network effects make non-linear shifts toward "tipping" or the "winner takes all" or "most" dynamic a feature of online markets. Here an online market typically converges into three or less dominant platforms. This is further self-reinforced considering that these platforms can expand their economies of scale and scope by having more capital to invest, more experienced workforce to design interfaces with algorithmic curated results, more data and are capable to branch out into adjacent markets. While this organic trajectory for digital platforms to three or less platforms contradict the evolutionary need for diversity⁴³, these platforms actually benefit from a diversity of businesses within their platform ecosystems. Also, the tendency is for smaller platforms within the online market to occupy niche positions⁴⁴ than to compete directly.

Taking the approach of natural evolution⁴⁵, the organic development of platforms is important. Scrutiny can be brought in where artificial means of reinforcing power, especially by the bigger platforms, is prevalent such as in the case of price parity and non-compete obligations. These hinder the natural development of the platform possibility space and restrict the natural evolution of rivals. For example, the Online Intermediation and Platforms Market Inquiry found that price parity obligations restricted hotels from developing their own booking platforms⁴⁶. Similarly, non-compete obligations stifle the movement of employees and the efficient allocation of skills that could potentially aid in fast-tracking competition, synergies and innovation.

Another non-organic form of platform development that can potentially stifle healthy competition and organic path dependencies of rival platforms and corresponding innovations is through the acquisition of rivals, especially killer acquisitions (e.g. Meta's purchase of Instagram) and anti-competitive behaviours (such as predation). For example, in the context that Instagram and WhatsApp weren't purchased by Meta, these platforms could have evolved to become effective

⁴² There is a bifurcation of online markets in favour of two or three platforms. OIPMI Final Report. Available: <https://www.compcom.co.za/online-intermediation-platforms-market-inquiry-final-report-launch/> [accessed 13 August 2025].

⁴³ Allen (1994: 15) notes that "*technological evolution is not about a single type of firm 'winning', through its superior behaviour, since, as we see, evolution is characterised more by increasing variety and complexity than the opposite.*"

⁴⁴ For example, local travel platforms such as Lekkeslaap, SafariNow, Afristay occupy niche positions in the South African online travel accommodation intermediation market where direct competition with Booking.com and Airbnb. OIPMI Final Report Annexure 2. Available: <https://www.compcom.co.za/online-intermediation-platforms-market-inquiry-final-report-launch/> [accessed 13 August 2025].

⁴⁵ First mover advantage or early uptake is certainly important in the development of a digital platform but not necessarily a sufficient criteria as other factors like path dependency matter. For example, several search engines preceded Google for a few years before it was launched in 1998.

⁴⁶ OIPMI Final Report Annexure 2. Available: <https://www.compcom.co.za/online-intermediation-platforms-market-inquiry-final-report-launch/> [accessed 13 August 2025].

social media rivals to Facebook and could have further pivoted into adjacent online markets or innovated their own novel online market.

Interdependencies feature between the strong network effects of leading platforms and the subsequent dependencies by business wishing to intermediate their websites, goods or services on these platforms. This means that each platform has an ecosystem of its own, where business depend on the platform's algorithm to display their goods and services to users and user choice is influenced by the platform's curated content. This is a double-edged sword in that these platforms open new distribution channels for businesses including those which wouldn't have sold goods and services beforehand (e.g. through eCommerce, short term room rentals, e-hailing etc.) and content providers (through social media) but at the same time give these platforms incredible power to extract rents and shape markets. If one were to remove a platform, say for industrial policy or geopolitical risk reasons, as a thought experiment, numerous businesses, especially small businesses, and individuals making a living off such platforms would be hurt⁴⁷. Yet this co-dependency can potentially hold back the natural evolution and development of markets, and hamstrung government interventions in these marketplaces⁴⁸.

Evolution of AI markets and capabilities: a new frontier

Evolution of AI markets

From an evolutionary point of view, it is important to allow for a diverse development of AI capabilities, models and products. Allen (1994) argues that technological evolution is characterized by increasing variety and complexity⁴⁹. With the release of ChatGPT 3.5 Large Language Model ("LLM") on 30 November 2022, the AI development Rubicon had been crossed. Currently there's an AI race towards developing and advancing AI capabilities with the USA and China leading the way where the largest developers of AI capabilities being private firms such as OpenAI, Google, Amazon, Meta, Baidu, Tencent etc. Over and above private firm attempts to develop AI capabilities; AI Policy is increasingly aiming for nation states to develop their own AI sovereignty⁵⁰. At this point in time, it's not clear which AI firm will "win" the "race", but it is certainly plausible that a diverse array of AI services, interfaces, models and capabilities can emerge serving both a general and niche suite of needs.

As structures grow organically, so AI needs space and freedom to grow and evolve responsibly. Responsible development would therefore layout a set of principals that that are not overly prescriptive or burdened with regulatory red-tape. These principals should therefore be aimed at preserving constitutional and human rights while maintaining transparency. AI must also be

⁴⁷ In the short to medium term at least.

⁴⁸ Dependency of businesses on unavoidable platforms to distribute goods and services, give platforms significant bargaining power, thereby limiting retaliatory measures by regulators and nation states.

⁴⁹ Allen, P.M. 1994. *Evolutionary Complex Systems: Models of Technology Change*. In *Evolutionary Economics and Chaos Theory*. Pinter Publishers Ltd. (London). [Published 1994].

⁵⁰ Vohra (2025). How Countries Are Building Sovereign AI to Reshape Global Strategy. *Nexgen Cloud*. Available: <https://www.nexgencloud.com/blog/case-studies/how-countries-are-building-sovereign-ai-to-reshape-global-strategy> [accessed 8 August 2025].

developed in a way that produces a healthy and diverse ecosystem of AI capabilities which in turn conserves a healthy business⁵¹ and content generating ecosystem⁵².

Evolution of AI capabilities and behaviour

AI-driven systems operate as autonomous actors where algorithms are the primary decision-makers - setting prices, personalizing content, and optimizing supply chains in real-time. This creates a new level of complexity that is increasingly outside human control. Humans can set the parameters and an objective function such as maximise profits, but AI can have agency in how it sets about achieving the objective function. Thus, setting the objective function responsibly is important. For example, instructing AI to maximise profits in digital advertising markets, may mean that the AI agent sets out maximising ad revenues by attracting maximum user attention and engagement to show more adverts. As a result, an unintended side-effect of maximising digital advertising profits is reinforcing user phone and social media addiction⁵³.

Machine learning (“ML”) aims to optimise and predict a certain outcome ($\hat{y}$) based on the vast amount of data available and the user’s interactions with an interface (e.g. a platform). However, AI interactions can also reinforce or change certain behaviours by displaying new content or prompting a user in a certain direction. For example, where user is not exposed to algorithms or has unwavering resolve, he or she has defined set of preferences that don’t change *ceteris paribus*, however the capacity to be distracted and in some case consciously explore algorithmic prompts or recommendations means that AI can steer users into a new world of preferences, desires, views and opinions that he or she wouldn’t have explored altogether. Therefore, AI recommendations and prompts become endogenous to a user’s preference function.

AI systems and models are constantly adapting and evolving, making them even more unpredictable. AI agents have the potential to autonomously evolve their own parameters and objective functions. For example, AI in evolution can be demonstrated by AlphaEvolve, a Google Deepmind product, set to understand the nature of biological evolution. AlphaEvolve is an agent that can go beyond single function discovery to evolve entire codebases and develop much more complex algorithms⁵⁴. Similarly in practice, the application of AI in marketplaces is resistant to static outcomes where one would have to consider the evolutionary path of markets guided by AI agency. For example, AI pricing algorithms can engage in a form of “algorithmic collusion” without any explicit human communication, leading to synchronized price increases that are difficult for regulators to detect using traditional methods. This also makes behavioural modelling and econometric delineations trickier⁵⁵. By 2030, it is estimated that there’s a 50% chance artificial

⁵¹ Without creating an environment that impedes, distorts or restricts competition, innovations and the development and growth of new rivals.

⁵² Such as original content used to develop LLMs (as in the case of news media).

⁵³ Social media is argued to fuel addiction by releasing dopamine, causing highs and lows of dopamine levels in what is termed the “dopamine loop”.

⁵⁴ AlphaEvolve (2025). AlphaEvolve: A Gemini-powered coding agent for designing advanced algorithms. Google Deepmind. Available : <https://deepmind.google/discover/blog/alphaevolve-a-gemini-powered-coding-agent-for-designing-advanced-algorithms/> [accessed 8 August 2025].

⁵⁵ As a predictive tool, AI and ML can predict market outcomes more accurately while incorporating changes in behaviour whereas econometrics predicts market outcomes imperfectly using a set of explanatory variables which can partially explain and not give holistic explanation of complex evolving

general intelligence (“AGI”) will be achieved⁵⁶. AGI is a hypothetical form of AI that possesses the ability to understand, learn, and apply its intelligence to any intellectual task that a human being can.

Evolutionary thinking in competition policy

A change in economic thinking

The current approach to competition policy, largely seems based on a static equilibrium-based model, may be less well equipped to assess a rapidly changing economic landscape, especially in high tech sectors like digital and AI markets⁵⁷. Competition laws in themselves are to an extent static and may face iterative alterations to match the general thought, economic thinking and economic realities of the time going forward. In a fast-changing world, the construction of competition laws can in themselves be formulated in a way that allows for a forward looking and increasingly flexible enforcement of a changing economic landscape. Market Inquiries are a fairly good tool for this⁵⁸. Application of case precedent should also consider nuances and changing realities, where what held true yesterday may not necessarily hold true tomorrow.

We are entering an era where market outcomes can at times appear to defy general economic logic. For example, Google’s paid search volumes have increased but so has cost per click (“CPC”) increased over time⁵⁹. Even Google’s executive, Michael Roszak, noted “we’ve essentially been able to ignore one of the fundamental laws of economics ... when talking about revenue, we could mostly ignore the demand side of the equation (users and queries) and only focus on supply side of advertisers, ad formats and sales”⁶⁰. These outcomes contradicts the traditional economic logic of ‘as prices increase, so volumes would decrease and vice versa’⁶¹. Economic thought is not set in stone, and at times, outcomes may seem counterintuitive. Evidence-led assessments, observation and a reasonable prediction into possibility space are important tools in competition enforcement armoury. Economic models are attempts to model a complex world and are precisely that, a static framework for analysis and an attempt to make sense of the complexity of the world.

markets. Another benefit of AI tools is that it can tailor predictors for individual actors accommodating for each unique characteristics whereas econometrics looks at the behaviour of economic actors on average.

⁵⁶ Demis Hassabis (2025). Future of AI, Simulating Reality, Physics and Video Games | Lex Fridman Podcast #475. (0h52min). Transcript available: https://lexfridman.com/demis-hassabis-2-transcript/#chapter13_future_of_energy [accessed 8 August 2025].

⁵⁷ Authors own views.

⁵⁸ To date several authorities such as the UK’s Competition Market Authority, the Competition Commission of South Africa, and the Australian Competition and Consumer Commission have conducted market inquiries in fast evolving markets like digital platforms and AI.

⁵⁹ Meyerson (2025). CPC inflation: How fast are Google Ads costs rising? SearchEngineLand. Available: <https://searchengineland.com/cpc-inflation-google-ads-costs-rising-fast-454291> [accessed 12 August 2025].

⁶⁰ Michael Roszak at a Google training in 2017. Court documents found in *Bloomberg*. Available: <https://www.bloomberg.com/news/articles/2023-11-17/google-s-doj-antitrust-case-explained-in-6-documents-googl?embedded-checkout=true> [accessed 11 August 2025].

⁶¹ This logic is also true in a traditional monopoly economic model which has a downward sloping demand curve. Luxury goods or Veblen goods see increases in quantity consumed as price increases, but this is typically in the context of conspicuous consumption where an item, like a luxury car, is more desirable the more expensive it becomes.

Forward looking and dynamic assessments

In the assessment of competition cases, especially those that are forward looking such as mergers and market inquiries, the assessment of dynamic analysis arises in importance in complex and changing world, especially for technology markets that are subject to frequent evolution. For example, applying a dynamic framework to understanding the Google paid search observation delineated in the previous paragraph, an increasing volume of paid clicks and corresponding increases in CPCs over time could possibly be explained by a dynamic of iteratively increasing shifts in demand for informational searches⁶² over time that outstrips increases in shifts of supply of paid search results⁶³.

Dynamic assessments of a market require a set of analytical tools that move beyond traditional metrics to assess complex, non-linear behaviour of markets under consideration, looking at movements into possibility space. In the merger context this includes an assessment of the removal of a potential competitor, an effective competitor or the so-called “killer acquisitions”. Doing such an assessment requires a degree of imagination as businesses that operate in seemingly different markets can evolve and portfolio into the acquiring firm’s market and become effective competition⁶⁴. For example, WhatsApp, an instant messaging service, could have evolved into a social media service independent from and a rival to Meta⁶⁵. Market inquiries can assess structural and behavioural features of the market, e.g. network effects, customer acquisition through deep pockets, price parity obligations etc. that can impede, distort or restrict competition⁶⁶ and address them to avoid the potential for “tipping”⁶⁷ as in the case of digital markets.

Given the unpredictable and chaotic nature of complex marketplaces, a more proactive and adaptive regulatory approach is needed. One might have to integrate a “precautionary principle” for mergers and acquisitions in highly dynamic and complex markets such as tech. Here regulators are more sceptical of deals that could eliminate an effective or potential future competitor. It also means building regulatory frameworks that are flexible and can adapt to new technologies and business models as they emerge, rather than being locked into rigid rules.

Fostering diversity and inclusion, the way forward!

From an evolutionary perspective fostering ‘variation’ is the key to maintaining a competitive market in complex system by ensuring a continuous stream of new ‘variations’ and to prevent the ‘retention’ of anticompetitive practices and market features that raise barriers to entry and

⁶² Graphically this represents iterative shifts in the downward-sloping demand curve to the right over time for informational searches, reflecting a continuously changing (non-static) shifts in demand for informational searches over time.

⁶³ Authors own observations.

⁶⁴ This is especially the case where the target firm already has a substantial or growing network of users.

⁶⁵ Meta has acquired WhatsApp, and the service currently features social media like WhatsApp Stories. Authors own imagination.

⁶⁶ This was done in the Online Intermediation Platform Market Inquiry. See OIPMI Final Report. Available: <https://www.compcom.co.za/online-intermediation-platforms-market-inquiry-final-report-launch/> [accessed 13 August 2025].

⁶⁷ In markets that experience strong network effects, “tipping” relates to the effect where a competitive market shifts into a “winner-takes-all” or “winner-takes-most” dynamic.

expansion. Variation in markets can be boosted by: (i) creating means for data portability and interoperability which make it easier for users to switch platforms; training of AI models and developing new AI capabilities; and for new firms to access the data needed to compete. This reduces the "lock-in" effect of network-based monopolies and incumbent tech players with unparalleled data and opens the expansion possibility front of new rivals that need data as a key input. While it currently does not exist, policy makers can consider the possibility of a "mandatory public database" for all kinds of stakeholders to access a nation-wide pool of non-personal data⁶⁸; (ii) regulating AI algorithms, one can ensure transparency and accountability in how AI systems are used and trained, as well as algorithms determining prices and curating results and content to ensure fairness, representation and a healthy variation of AI recommended results on a platform⁶⁹; (iii) maintaining open standards and API for key technologies such as LLMs to prevent proprietary systems from becoming entrenched and locking out competitors.

Competition policy can also be used to support diversity and resilience. This includes policy that fosters inclusivity, assessing the impact of business practices on SMEs and innovation, and fostering SME and startup development. Public interest considerations, especially those that are relevant for business inclusion and small business participation are important for developing a diverse business ecosystem. A diverse business ecosystem builds resilience and complexity, and resilience in turn can foster further diversity perpetuating an evolutionary "diversity-resilience virtuous cycle"⁷⁰. Marketplaces that are highly concentrated with a few dominant players can impose systemic risks. For example, this includes companies that are considered to be or see themselves as "too big to fail", where they are so large and interconnected with the broader economy that their collapse would trigger a catastrophic domino effect⁷¹. Companies that are "too big to fail" might engage in moral hazard⁷² by undertaking unnecessary risks in knowledge that government would bail them out. From an ecological perspective, the "too big to fail" firm unnecessarily diverts resources to protect it from potential failure and puts stress on the broader economic ecosystem. The economic ecosystem formulates an unhealthy co-dependency to the "too big to fail" business.

Building resilience and promoting positive-sum outcomes

Lastly, both industrial policy and competition agencies can be mindful of promoting resilience both in the marketplace and at the institutional level. Building resilience can help authorities in making decisions to reinforce economic robustness while navigating uncertain and changing times. It is important that the marketplace and institutions run efficiently and optimally, but there

⁶⁸ The concept of a "mandatory public database" is the author's idea.

⁶⁹ For example, a study done by Lee and Hosanagar (2019) assessed the impact of collaborative filtering recommender algorithms (e.g., Amazon's "Customers who bought this item also bought") commonly used in e-commerce on sales diversity. It was found that while recommender algorithms decreased diversity at the aggregate level but increased diversity at the individual level. Lee, D. and Hosanagar, K. (2019). How Do Recommender Systems Affect Sales Diversity? A Cross-Category Investigation via Randomized Field Experiment. *SSRN Electronic Journal*: 10.2139/ssrn.2603361.

⁷⁰ This is the authors own terminology.

⁷¹ This could include financial insecurity (e.g. financial collapse), a loss of a major employer, the loss of a key national asset (e.g. a national airline) or a loss of key (indispensable) supplier (e.g. railway services, energy, etc.).

⁷² In economics, a moral hazard is a situation where an economic actor has an incentive to increase its exposure to risk because it does not bear the full costs associated with that risk, should things go wrong.

is scope for some slack to be built into the system to allow for adaptation in light of unexpected changes. As one moves into the future there is potential for increasing abundance, as systems evolve from zero-sum to positive-sum outcomes. This requires an open mind and awareness to identify positive-sum outcomes, to support them and integrate these outcomes into broader policy and strategy. Positive sum outcomes can foster growth and potentially has tremendous human welfare benefits, but policy makers also need to decide how these positive spillovers are distributed amongst individuals for their benefit and flourishing.

Conclusion

The economy is not a predictable machine but a complex, at times chaotic, and continuously evolving system. This is particularly true in a period of increasing global uncertainty and fast changing technological development, as currently demonstrated by the ubiquity and change of digital platforms and AI. By integrating evolutionary thinking into economic systems, regulators, planners, and governmental decision makers can move beyond a purely static, reductionist, and backward-looking approach⁷³ to elevating dynamic, path dependent and forward-looking assessments of the marketplace.

The economy, as with complex systems, is greater than the sum of its parts. This sometimes results in positive sum outcomes, something that authorities and policy makers can promote. The marketplace is also characterised by a plethora of interrelationships and interdependencies, working together in its own unique symbiotic way. Competition and scope for error-making drives exploration and innovation but this too evolves into complementarity and cooperation. Diversity reinforces complexity, complexity feeds on itself and provides a platform on which resilience can be built. A resilient economy in turn fosters an environment that promotes diversity, thereby creating a *diversity-complexity-resilience virtuous cycle*. Local freedoms allow individuals and firms to experiment, innovate, compete, and cooperate thereby facilitating a healthy economic ecosystem.

Competition and industrial policy that fosters diversity and inclusion and provides scope for resilience building in the marketplace can sustain a robust economy going forward. Transformative technologies like digital markets and AI will be mainstays of our economic system, and with this rapid, unpredictable and non-linear change will happen. Approaching these challenges with an open and evolutionary mindset is critical. As we move forward into uncharted territory, we will need humility and continuously reassess our assumptions and model of the world. Here natural systems can be our greatest teacher in understanding economic systems and the future possibilities they can occupy.

⁷³ Static market assessments are still important, but it should be complemented by thorough dynamic assessments in fast evolving markets.