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**On The Shoulders of
Giants**

**Mental Models for the
New Millenium**

Volume 2

Introduction

“If I have seen further it is by standing on the shoulders of Giants.”

-Isaac Newton

Charlie Munger, Vice Chairman of Berkshire Hathaway, likes to talk about the necessity of having “mental models”—theoretical frameworks that help investors better understand the world.¹ According to Munger, investors must possess a variety of mental models drawn from the central tenets of many disciplines. Investors using inappropriate or outdated models risk applying the wrong tool to solve their problems. As Munger likes to say: “To a man with a hammer, everything looks like a nail.”

A constantly changing world demands that we constantly update our mental models. This is becoming increasingly important for investors as the world evolves from the old economy—based on lots of physical capital and little knowledge—to a new economy based on lots of knowledge and little capital. As technology continues to elevate the importance of knowledge, this trend has become intractable.

The goal of this report is to lay out mental models for understanding businesses in the new economy. In many cases the new models are radical departures from the current strategy dogma. And their relevance is growing rapidly as the world becomes increasingly digitized. We believe that all investors—not just those involved with high technology—will need to understand the new ground rules if they are to outperform the market.

Fortunately, in our search for these new mental models, we can draw upon groundbreaking research done by economists such as Paul Romer and Brian Arthur. It is this idea that knowledge begets knowledge that inspired the report’s title. The quotation from Isaac Newton meant to convey that his discoveries would not have been possible had it not been for the ideas developed prior to his work.²

This report is organized into four parts. First, we discuss on the shifting role of technology in business and how that sets the stage for the new economy. Second, we touch on “software”—the defining feature of the new economy—and what growth in software means for growth in economic activity. Third, we review the central mechanisms, characteristics and results that comprise the new economy strategy toolbox and touch on how investors can use these tools. Finally, we explore how these mental models relate to key value drivers for the stocks of new economy companies.

**The Shifting Role of
Technology**

Before delving into the how and why strategy is changing, it is worthwhile to explore in more detail the concept of the new economy and why it is so important.

We can start with the changing role of technology in business over the past century (see Table 1). The old economy gives rise to the picture of the factory. Inputs went in, technology—task-trained workers and automated machinery—manipulated the input to add value, and a finished good came out. Although technology allowed for greater productivity, it was generally fixed, inflexible and mechanistic.

Table 1
Technology's Changing Role in Business

Early 20 th Century	Early 21 st Century
Mechanistic	Virtual
Deterministic	Non-deterministic
Metallic	Software driven
Stand alone	Massively interactive
Fixed	Continuously reconfigured

Source: W. Brian Arthur, Stanislaw M. Ulam Memorial Lectures.

In contrast, technology in the 21st century has characteristics that are more life-like—more like an organism. Technology is flexible, interactive and can even, in some cases, “think.” This change in the role of technology forces us to renew our strategic frameworks with fresh mental models.

There are three distinct macro features of the new economy that bear further exploration:

- *The economics of networks.* The larger a network, the more valuable it becomes. Driven by positive feedback loops, networks of knowledge-based products are becoming increasingly central to today's economy. While networks and positive feedback existed to some degree in the old economy, they were largely the result of *supply-side* economies of scale, and hence ran into natural physical limits. In contrast, network economics are driven by *demand-side* economies of scale in the new economy. This creates operating leverage that does not dissipate when the market expands.³
- *The dramatic reduction in transaction costs.* While transaction costs in the old economy were trending lower, cheaper computing and the power of networks have massively accelerated the rate of decline. Lower transaction costs mean much less friction in economic interactions, making mass customization possible.⁴

Table 2
The Shift from “Atoms to Bits” Lowers Transaction Costs

Average Cost per Transaction in Retail Banking

Channel	Average cost per transaction
Branch	\$1.07
Telephone	0.68
ATM	0.27
Internet	0.10

Source: *Unleashing the Killer App: Digital Strategies for Market Dominance*, Larry Downes and Chunka Mui.

- *The central role of knowledge.* Whereas physical capital and its manipulation was the focal point of the old economy, knowledge and its manipulation are the crux of the new economy. Because the fields of economics and accounting were largely developed when the old economy dominated, outdated mental models are often being applied to understand the new economy

The business world can be viewed as a continuum. Some businesses have predominately old economy characteristics while others—concentrated in high technology—have new economy features. But as networks, lower transaction costs,

What's "New" About the New Economy

and knowledge move to center stage, the trend is steadily moving towards the new economy model.

Economist Paul Romer asks and answers a fundamental question: Why are we so much "wealthier" today than 100 years ago, when the amount of physical resources on the earth is essentially the same? The answer is in our growing ability to use so-called "software" to rearrange those resources in more valuable ways.⁵

The key to the new economy, then, is "software." Software can be formally defined as a set of instructions, formulas, or processes that are followed in order to create value.

"Software" in this sense has at least three characteristics that make it vastly different than physical capital:

- *Software and sharing.* In economic parlance, "software" is a *non-rival good*: unlike traditional physical resources, "software" can be used by more than one person at a time. In an ideal world, this allows instructions to be passed along cheaply and easily without causing congestion.⁶
- *Low incremental costs.* Once the cost of developing "software" is incurred, there are essentially zero incremental costs to replicate it. This point has very important economic implications, because it underscores that there are no physical limits to growth. It can also be a mixed blessing. On the one hand, the spreading of good "software" is beneficial. On the other hand, economic incentives for innovators to develop "software" must be maintained. This is particularly important because "software" can have high upfront costs.
- *Increasing returns.*⁷ The more "software" that is in existence, the more opportunities that arise. *In fact, the larger the body of software, the faster the growth.* This notion lies at the heart of endogenous growth theory. Most inventions combine technologies in new ways to solve a given problem. The more building blocks that exist to solve problems, the more potential opportunities there are to find solutions.

A simple mathematical example illustrates the power of added software. Assume you had four building blocks to create potential solutions. The number of possible combinations is $4 \times 3 \times 2 \times 1$, or 24. Assume that the number of building blocks rises 50% to 6. The new number of potential combinations— $6 \times 5 \times 4 \times 3 \times 2 \times 1$ or 720—is 30 times greater. As Romer likes to point out, you can sequence 20 steps in roughly 10 to the 19th power ways—a number larger than the total number of seconds that have elapsed since the Big Bang created the universe.

The fact that more software building blocks leads to faster growth is fundamentally very bullish. It is true that vast majority of the imaginable "software" combinations are useless. But with computing power, we can find new solutions faster and cheaper than at any time before. This suggests that the companies that spend the most on research and development may have the greatest growth opportunities.

Strategy Old and New

The mainstream way of thinking and teaching about economics and strategy has been dominated by two themes. The first is the metaphor of the world as a closed, equilibrium system. This perspective can be traced back to the deterministic, clean and orderly world of 19th century physics. Following the lead of the hard

sciences, economists developed rigorous mathematical frameworks to model the world.⁸

In this framework, prices are determined by the intersection of supply and demand curves, and exogenous shocks to the system are temporary. The system ultimately settles back to its natural, equilibrium state. In truth, this framework remains very useful in many parts of the economy, including energy and commodity agriculture.⁹

The second theme is that physical capital is central to wealth. For example, traditional dual entry accounting is best at handling tangible assets. Intangibles such as goodwill are not dealt with as gracefully—and there is no widely accepted way to account for intellectual capital. Accordingly, the financial statements companies and investors use to make decisions are becoming less and less reflective of what is going on in the world.¹⁰ Investors should be wary of the growing chasm between accounting stories and economic reality.

Breaking away from these well-worn themes will not be easy. However, the rules of the game are being rewritten, and investors must adapt. Forty years ago, technology-intensive companies were barely represented in the broadly followed stock market indices. Today, technology represents one of the most dynamic drivers of our economic growth.

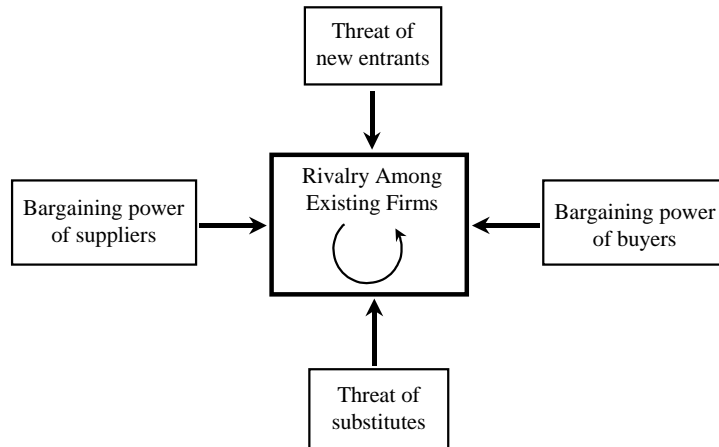
The Old: Closed Frameworks and Linear Value Chains

Consistent with the equilibrium and capital-centric view has been the development of strategy frameworks that represent largely “closed” or “linear” systems. In this world, mechanistic rules and cause and effect thinking dominate.

The well-known “five forces” industry structure model laid out by Michael Porter is an example of a “closed” system.¹¹ (See Figure 1.) At the core lies the rivalry among competitors, which tends towards stability. When external forces—shifts in the power of buyers or suppliers, for example—disrupt the equilibrium of the system, it reacts and it rebalances. This model describes many parts of the economy.

In contrast, emerging new economy businesses tend not towards stable equilibrium, but rather face dynamic and ever-changing competitive landscapes. The industries operate at the “edge-of-chaos,” an overused phrase that nevertheless evokes the inherent lack of predictability, speed of change and absence of determinism that characterizes them.¹²

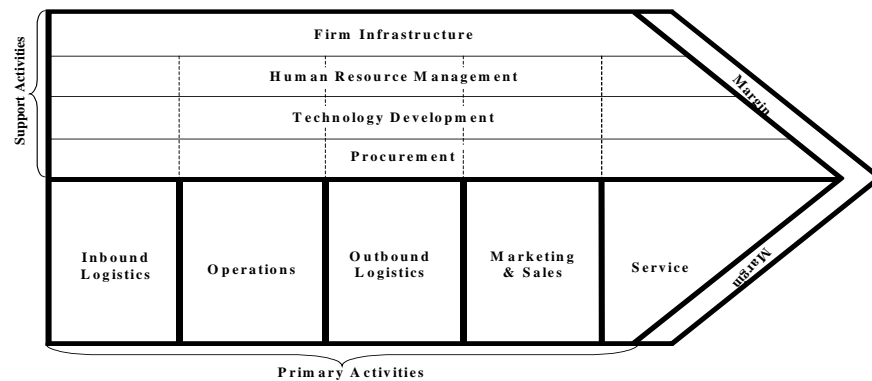
Figure 1
Porter's Five Forces— The Determinants of Industry Structure



Source: Michael Porter, *Competitive Advantage*, 1985.

Value chain analysis—another tool paid out by Porter—serves as an illustration of a linear framework (Figure 2). The mental image is of a physical product being passed down the line, value added along the way, until it reaches the consumer. This analysis is also applicable in many situations but does not capture the dynamics of some businesses very well, especially when the product is a virtual unit of knowledge rather than a tangible unit of capital.

Figure 2
Porter's Value Chain— Identifying Corporate Activities



Source: Michael Porter, *Competitive Advantage*, 1985.

The New: Open Networks and Economic Webs

Michael Rothschild coined the word “bionomics” to describe the study of economic relations between organisms and their environment.¹³ Rothschild’s term characterizes the new models of strategy, which do not depend on unique equilibrium, diminishing returns and continuous improvement. Rather, the new models have distinct rules and properties unfamiliar to the old economy: inherent market instability, multiple potential outcomes, the predominance of inferior products, and winner-take-most profit outcomes.

In this section we outline this new world of strategy by looking at four of its elements. These include its mechanisms, results, characteristics, and the applicable

strategies companies and investors can use to successfully play by the new rules.¹⁴

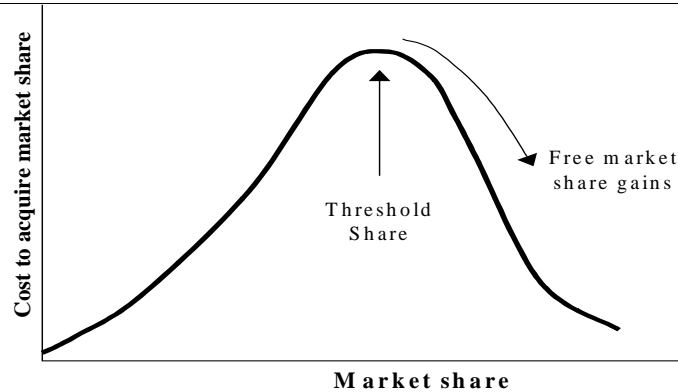
Mechanisms. While much ink has been spilled on the results of the new economy —“natural” monopolies, increasing returns, the dominance of inferior products— not as much attention has been paid to the mechanisms that lead to these results. Indeed, the U.S. Government’s anti-trust case against Microsoft can be cast precisely in these terms: no one doubts that Microsoft has a virtual monopoly in desktop computer software (result). The question is whether or not they are using their monopoly “unfairly” to extend into new markets (mechanism).

There are seven main mechanisms that we identify. Each of these is to some degree evident in the old economy, but their importance in the new economy is much more significant. They are as follows:

- *High upfront costs.* The cost of developing new “instructions” or “software” can be very high in the new economy. For example, huge spending preceded Pfizer’s blockbuster drug Viagra, Microsoft’s Windows 95 and Fox/Paramount’s film Titanic. However, the cost of replicating and distributing incremental units of knowledge-based products is generally very low. The ability to increase sales at a more rapid rate than expenses is key to scalability in a business model. In contrast, upfront costs in the old economy are generally lower, but marginal units are generally more expensive.¹⁵ With upfront costs, size matters. Increasingly, advantage will accrue to those companies that can afford to spend the most on R&D and marketing.
- *First-mover advantage.* First movers often have the opportunity to capture the greatest “mind-share” by setting standards, establishing brands, increasing switching costs, and building valuable networks. Hence they capture customers who will be reticent to switch to a competing product over time. However, first mover is no guarantee of success: Prodigy’s first mover advantage in the on-line services market was overwhelmed by its inability to build a sufficient user network. Other famous failed first movers include VisiCalc and WordStar.
- *Path dependence.* Path dependence occurs when positive feedback loops cause self-reinforcing patterns to emerge.¹⁶ These patterns are set by initial conditions and are often influenced by random or chance events—which means that the outcome of such a process may be indeterminate. One famous example is the emergence of VHS versus Betamax.¹⁷ Although it has been argued that Betamax had superior technology in many ways, the scales initially leaned in VHS’s favor because of its longer recording time. Once the process started, the feedback loops kicked in: more VHS machines sold, lead to more VHS tapes made, lead to more machines sold, and so on.
- *Tipping points.* Path dependence and tipping points are closely related concepts. Adopted from demographic economics, the term tipping point refers to the level of market share at which future market share gains become cheaper-and-cheaper to acquire. (See Figure 3). In other words, positive feedback loops create market share momentum such that incremental success is assured. Human nature often fuels this process, as industry visionaries generate positive word-of-mouth from early adopters, whose influential recommendations result in mass-market dominance.¹⁸

As Kevin Kelly points out, tipping points have always existed but because of the nature of the new economy, there are now lower “thresholds of significance.” This means that innovations, growth rates and market share movements must be taken seriously earlier than in the past. Tipping was evident in the personal computer operating system market as the Microsoft’s Windows standard ran away with the market at the expense of Apple’s Mac OS.

Figure 3
Tipping Points: The Point of No Return



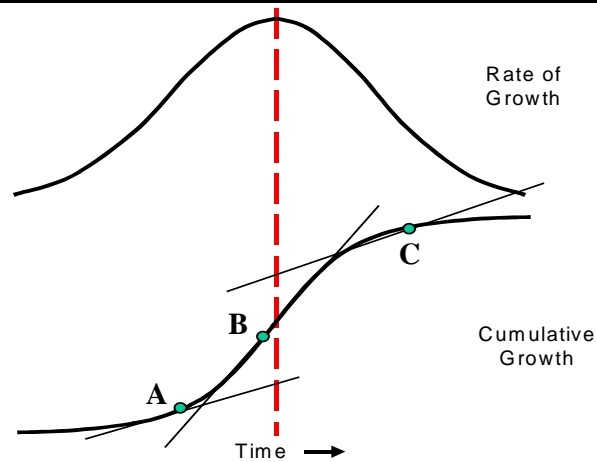
Source: Kevin Kelly, *New Rules for the New Economy*, 1998.

- *Network effect.* Also called network externality, the network effect occurs when the value of joining the network is higher when the network has more subscribers. This idea is popularly known as “Metcalfe’s Law”, named after Bob Metcalfe, the inventor of the Ethernet standard and founder of networking company 3Com Corporation. The network effect can be thought of as *demand-side* economies of scale, as opposed to traditional *supply-side* economies of scale.

In a traditional network—such as the telephone system or on-line chat—the network effect comes about because members value the ability to reach fellow members in large networks. In a virtual network—one linked by complementary products such as a compact disc player and CDs—network externalities arise as sales of one component induce sales of another component, and vice versa.¹⁹

- *Positive feedback.* The strong-get-stronger and weak-get-weaker nature of the new economy arises from positive feedback. Because of this mechanism, new technology markets often follow an S-curve. S-curves show cumulative product sales, and can often be described in three phases: flat growth in early stages; rapid growth as positive feedback kicks in; and leveling off as saturation is reached. Investors need to be particularly attuned to the onset of rapid growth, referred to as the “elbow” of the curve. Notably, expectations often reflect linear extrapolations of near-term trends (see lines A, B, and C in Figure 4) leading to potential perception gaps.²⁰ Markets that have followed this non-linear growth pattern include TVs, faxes and the Internet.

Figure 4
S-Curve Growth Markets Often Generate Perception Gaps



Source: *Predictions*, Theodore Modis, Ph.D.; *Above the Crowd*, Bill Gurley, CSFB Equity Research, March 20, 1995.

- Lock-in.** Lock-in is both a mechanism and a result. High-technology products are typically hard to use. Once a customer develops user skills with a given product, or sets corporate standards for a product, they are often very reticent to switch to a competing offering. This is true even if the rival product offers superior performance characteristics. Hence, the customer is locked-in, and is much more open to highly profitable product upgrades than outside solutions. Examples of lock-in and their related switching costs are offered in Table 3.

Table 3
Types of Lock-in and Associated Switching Costs

Type of lock-in	Switching costs
Brand-specific training	Learning a new system; both direct costs and lost productivity; rises over time
Information databases	Converting data to new format; tends to rise over time as collection grows
Search costs	Combined buyer and seller search costs; including learning about quality of alternatives
Loyalty programs	Any benefits lost from an old supplier; possible need to rebuild cumulative use

Source: *Information Rules*, Carl Shapiro and Hal R. Varian.

Results. These mechanisms lead to results that stand many of our traditional economic beliefs on their head. It is generally assumed that competitive forces drive returns on capital down to opportunity cost, that monopolies are bad and that the best product wins. This is not always true in the new economy:

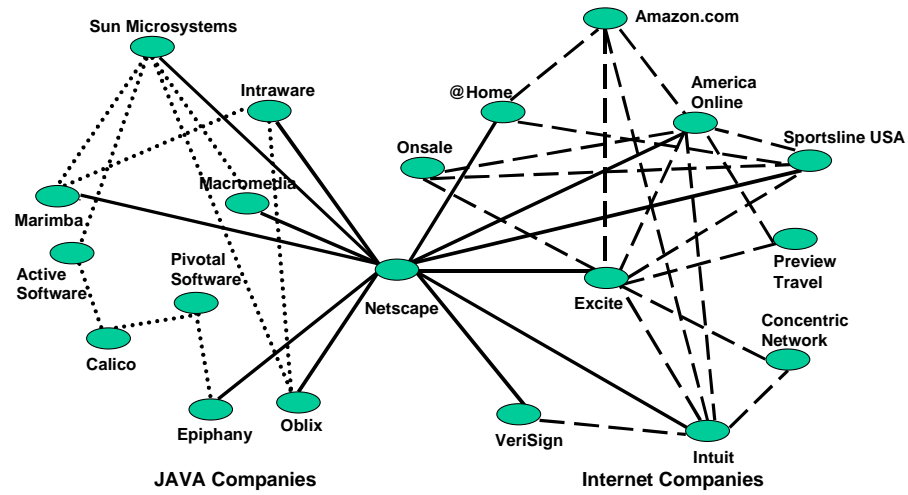
- Increasing returns.** Increasing returns “are the tendency for that which is ahead to get further ahead, for that which loses advantage to lose further advantage.”²¹ It is the result of positive feedback loops. In the new economy, the process generally has a few steps. First, a knowledge-based product is created, often incurring substantial upfront cost. Next, the product gains market share, with an acceleration of share gains after reaching the tipping point. Incremental revenues are then enjoyed with negligible cost. As revenues grow without new investment, the business enjoys increasing returns on capital.

- *Monopoly rents.* In order for there to be an incentive to create new “software” or instructions, with its high upfront costs, there has to be a possibility or probability of generating monopoly returns for a period of time. This may be formal (patent) or informal (lock-in). Because “software” is a non-rival good, monopoly returns are more important with “software” than with rival goods such as physical capital. In the new economy, there is generally no need to “stop” monopoly returns: the very increase in “software” suggests that the pace of discontinuous innovation will accelerate. Monopoly returns will be blown away by Schumpeter’s “gale of creative destruction” at a faster-and-faster rate.
- *Dominance of an “inferior” product.* The “best” technology is not necessarily the winning technology in the new economy. This maxim holds true for a couple of reasons. First, inferior products can get locked-in. Users learn how to use a given product, and the cost of a competing product and the training it requires is too great to justify switching. The QWERTY keyboard, designed to be slower than other layouts, is an example. Second, the value of the “web” surrounding and supporting a product may be more important in a purchase decision than the product viewed in isolation. The quality of a product is just one of many considerations in its attractiveness for users.

Characteristics/features. Successful strategy development in new economy terms requires thinking more like a biologist than like a physicist. The reason is that the role of technology has changed from being a mechanistic enabler to a more organic, flexible facilitator. Accordingly, the characteristics of new economy businesses can best be described using terminology from biology:

- *Economic webs.* While most businesspeople are used to thinking about a value chain, new economy thinking stresses “economic webs.” Webs derive value from the alliances of the companies, often offering complementary products or services built around a standard.²² While the standard-bearer may engulf the lion’s share of the web’s profits, the value of any node in the web is intimately linked to the value of the web overall. And, as with networks, bigger is better. (See Figure 5.)

Figure 5
Economic Web - Partnerships across the Kleiner Perkins Family



Source: *Fortune*, October 26, 1998.

- *Evolution/co-evolution.* The ideas of evolution are useful in understanding the new economy. The introduction of the word “complementor” into our lexicon is an example. Strategy professors Adam Brandenburger and Barry Nalebuff, who dubbed the term, say that a player is your complementor “if customers value your product *more* when they have the other player’s product than when they have your product alone.”²³ As species in nature have learned to co-evolve, so too have companies. The Microsoft-Intel relationship is a good illustration: more powerful Intel chips support more powerful Microsoft software, and vice versa. The takeaway is that investors must understand both competitors and complementors in sizing up a company’s prospects.

Another point worth noting from evolution is the greater the number of species, the greater the number of ecological niches that open up. Similarly, the proliferation of products creates new product niches. As a result, investors should expect lots of companies to pop up in order to fill economic niches—although their existence may be short-lived. The ecosystem is at once more dynamic and more fragile than the past.

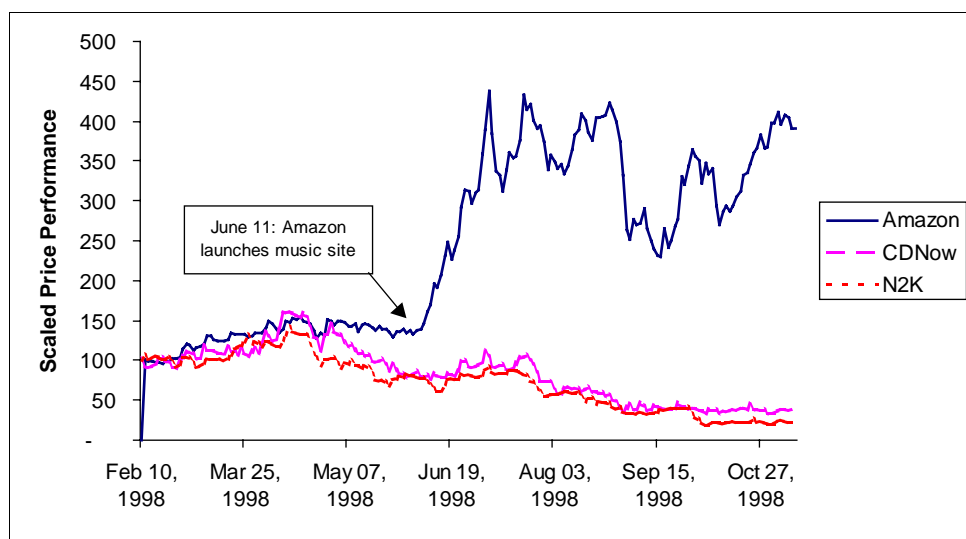
- *Punctuated equilibrium.* The theory of punctuated equilibrium, articulated by professors Stephen Jay Gould and Niles Eldredge, says that evolutionary changes are not always gradual, but are sometimes sudden. The old economy is characterized by small, incremental improvements—still a relevant and valuable way to think about many sectors today. In contrast, new economy companies often face punctuated equilibrium—stark change fostered by discontinuous innovation.²⁴

Knowledge companies are generally structured to accommodate this new reality. They are often flat organizationally, and the buzz is about “the next big thing.” Industrial companies tend to be hierarchical, and the chatter is about doing little things better. Kevin Kelly sums up the dichotomy with some new economy advice: “Don’t solve problems, seek opportunities.”²⁵

What investors should look for (and what managers should do). Now that we have outlined the mechanisms, results, and characteristics of new economy businesses, we turn to signposts to recognize in evaluating strategies and corporations:

- *Heavily discount—or give away—new products.* In spite of heavy up front costs, establishing a user base as fast as possible increases the potential for first mover advantage, to gain lock-in and to build a valuable network. Hence, giving away products is often the best way to build value. The implicit understanding in the “give-it-away” strategy is that established users will be willing to buy upgrades or ancillary products down the road with attractive economics for the producer. Netscape gave away 200 million browsers with precisely this intention. Unlike traditional businesses, in the new economy what is initially the cheapest product may ultimately be the most valuable product.
- *Link and leverage.* This is the process of transferring a user base built on one node of technology to neighboring nodes. Once consumers become accustomed to a given technology or interface, linking and leveraging is a powerful way to create value. Microsoft’s strategy of bundling ever-increasing functionality into its operating system and Amazon’s move into the music business are good examples. This strategy can have significant stock price implications for both the “linker” and the company that was “leveraged” out of its niche. This is demonstrated by the stock market’s reaction to the e-commerce gorilla—Amazon.com—entering the niche of on-line music vendors like CDNow and N2K (see Figure 6).

Figure 6
Stock Market Reaction to Amazon’s “Link and Leveraging” Into the Music Business



Source: Company web sites and CSFBC Analysis.

As an aside, we believe that traditional valuation tools may not properly capture the value of a link and leverage strategy. Here we believe valuing this strategy as an option to invest in a profitable business may be a more revealing approach.²⁶

- *Understand the power of the economic web.* The value of the web should be considered ahead of the merits of a given product or offering. Some of the strongest webs are built around open architectures or standards. As an economic web builds around a standard, the standard bearer may reap disproportionate benefit, but even smaller players will reap rewards. Superior products are no assurance of success; the economic web takes precedence. A simple formula for assessing a company's potential value is the total value added to the web times a company's share of the web.²⁷
- *Think adaptation, not optimization.* As technology puts evolution into fast-forward, companies face at least two challenges. First, they must determine where the world is going and how to avoid being "discontinuously innovated" out of business. There will be many blind alleys and dead end roads, and managers need to be flexible enough to go with the economic flow. Second, companies must be willing to let go of success. Managers, and by extension organizations, generally seek to optimize what they know, not wanting to be distracted from what has made them successful. However, the accelerated rate of change means that slow-movers will be severely punished. Cannibalization of core operations, sudden strategy shifts and a heightened focus on "economic half-lives" will be defining characteristics of new economy product markets.²⁸ The attribute to seek in managers—the new economy navigators—is adaptability.
- *Psychological warfare.* Just as the male iguana puffs up its body to intimidate competitors, new economy companies will use announcements, half-truths and posturing to keep competitors off balance. One well-known example is "vaporware." By promising products that do not yet exist, companies can defer purchases by customers and block out potential competitors. Investors in particular must be tuned in to such posturing, with the understanding that all management proclamations cannot be taken at face value.

Practical Impact on Value Drivers

Now we shift from theory to practice by considering how these economic outcomes translate into stock price changes. It should be noted that the use of an up-to-date strategic framework does not alter the basic principles of capital markets. Three key economic drivers determine value: cash flow, risk and the sustainability of excess returns. We discuss each in turn and explore what the new business models means for each of them.

Cash flow is defined as the cash-in versus cash-out for a given company. It can be expressed as the difference between earnings and investment in future growth of the business. Companies that experience increasing returns typically benefit on multiple fronts: sales growth is exponential as a product takes off or a network reaches critical mass; marginal unit costs are low and decline over time; and incremental investment needs are very modest.

Importantly, many investors are used to a linear world. As a result, non-linear growth can be *systematically* undervalued in the marketplace, leading to superior investment opportunities. Examples of companies that have witnessed exponential growth include Microsoft, Cisco and America Online.²⁹ On the other hand, when the competitive scales shift, investors often do not identify the losers quickly enough. From an investment perspective, a winning strategy is to identify industry "gorillas" as early as possible and to sell off all other competitors.³⁰

Next is the issue of risk. It is reasonable to assume that a company that has locked-in its customer base has less volatile cash flows that make it a less risky investment. All things equal, lower risk translates into a higher valuation multiple.

Finally, there is the issue of sustainable competitive advantage. We quantify this notion with what we call “competitive advantage period”— or CAP—literally the period of time a company can generate excess returns on new investments.³¹ CAP is one of the most important drivers of shareholder value, yet is rarely explicitly quantified. It is of critical importance in understanding how these new dynamics translate into stock prices because the longevity of business models in the new economy is likely to be shorter than old economy as the result of discontinuous innovation.

Businesses that achieve the increasing-returns feedback cycle get stronger and stronger over time. Hence, their sustainable competitive advantage *strengthens*. This is counter to the traditional micro-economic theory of diminishing returns. Generally, the lengthening of the lead company’s CAP *comes at the expense* of its competitors. Accordingly, it behooves the investor to identify the dominant company in a given space as soon as possible, as these companies tend to enjoy massively disproportionate percentage of industry growth and value creation.

The winner-take-most characteristic of the new economy, then, flows through each of the main stock price value drivers. And the affects on share prices are not subtle: it is not unusual for the gorilla in a given space to trade at a valuation multiple five times its weakest competitor. We believe that the marriage of the new economy strategy framework with a sound valuation model will be a necessary tool in any investor’s toolbox for the 21st century.

Appendix A

Table 4
The Old and New Economies at a Glance

Traditional forces	Old economy	New economy
Power of buyers	Buyer concentration	Economic web comes first
	Buyer volume	Distribution of knowledge is cheap
	Buyer switching costs	Standards lower prices and costs Give-it-away strategy
Power of suppliers	Differentiation of inputs	Virtual companies
	Presence of substitute inputs	Standards lower substitution risk
	Supplier concentration	Focus on cooperation versus "extracting"
	Importance of volume to supplier	Information sharing
	Threat of backward integration	
Substitution threat	Relative price performance of substitutes	Lock-in
	Switching costs	Inferior technology may win
	Buyer propensity to switch	Bet on the web, not the product Discontinuous innovation
Barriers to entry	Economies of scale (<i>supply side</i>)	Economies of scale (<i>demand side</i>)
	Proprietary product differences	Network effect
	Switching costs	Upfront costs
	Capital requirements	Lock-in
	Access to distribution	Tipping points
	Cost advantages	Path dependence
	Government policy	Link-and-leverage
	Potential retaliation	
Rivalry	Industry growth	Increasing returns
	Over/under capacity	Standards
	Informational complexity	Co-opetition vs. Competition
	Diversity of competitors	Discontinuous innovation
	Corporate stakes	Competing economic webs
	Exit barriers	

Source: Michael E. Porter, *Competitive Advantage* (New York: Free Press, 1985), CSFBC.

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 Cisco Systems (CSCO, 64 11/16, Buy)
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 Intel (INTC, 103 3/4, Buy)
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 Netscape (NSCP, 27 1/4, NR)
 Pfizer (PFE, 105 5/8, Hold)
 Viacom (VIAB, 64 11/16, Buy)

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- ¹ “A Lesson on Elementary, Worldly Wisdom as it Relates to Investment Management and Business”, *Outstanding Investor Digest*, May 1995.
- ² Interview with Paul Romer: <http://www.strategy-business.com/thoughtleaders/97110/page1.html>.
- ³ *Information Rules*, Carl Shapiro and Hal R. Varian, (Harvard Business School Press, Boston, 1999).
- ⁴ *Unleashing the Killer App*, Larry Downes and Chunka Mui, (Harvard Business School Press, Boston, 1998).
- ⁵ “Bank of America Roundtable on The Soft Revolution: Achieving Growth by Managing Intangibles,” *Journal of Applied Corporate Finance*, Summer 1998.
- ⁶ “Endogenous Technological Change,” Paul M. Romer, *Journal of Political Economy*, 1990, vol. 98, no. 5, pt. 2.
- ⁷ The phrase “increasing returns” has been used with greater frequency recently in spite of the fact that it has no singular definition. We count at least four senses of the term (three of which we employ in this report). First is the notion that knowledge begets more knowledge. Second is the economy of scale associated with the network effect. Third is the benefit from the universal learning curve. Finally is the high-upfront-cost, low distribution cost characteristic of new economy businesses.
- ⁸ *More Heat than Light: Economics as Social Physics, Physics as Nature’s Economics*, Philip Mirowski, (Cambridge University Press, Cambridge, 1989).
- ⁹ “Increasing Returns and the New World of Business,” W. Brian Arthur, *Harvard Business Review*, July-August 1996.
- ¹⁰ “Frontiers of Finance—A Piece of the Action,” Michael J. Mauboussin and Bob Hiler, Credit Suisse First Boston Equity Research, November 2, 1998.
- ¹¹ *How Hits Happen*, Winslow Farrell, (HarperBusiness, New York, 1998).
- ¹² *Competing on the Edge: Strategy as Structured Chaos*, Shona L. Brown and Kathleen Eisenhardt, (Harvard Business School Press, Boston, 1998).
- ¹³ *Bionomics: Economy as Ecosystem*, Michael Rothschild, (Henry Holt, New York, 1990).
- ¹⁴ “Increasing Returns and the New World of Business,” W. Brian Arthur, *Harvard Business Review*, July-August 1996.
- ¹⁵ Economist Brian Arthur has argued that the upfront cost dynamic may create greater instability in the economy. The point can be illustrated by thinking about a night out on the town. Assume there are two choices of bars, one with a high cover charge and free beers (new economy) and one with a moderate cover charge and expensive beers (old economy). Assuming the economy is poor is like going home early. Your all-in cost would be great at the first bar because the cost was upfront, while your all-in cost at the second bar would be more modest since the cost was more spread out. Hence the new economy may create more instability.
- ¹⁶ “Path-Dependent Processes and the Emergence of Macrostructure”, Arthur, Ermoliev, Kaniovski, in *Increasing Returns and Path Dependence in the Economy*, W. Brian Arthur, (The University of Michigan Press, Ann Arbor, 1994).
- ¹⁷ *The Winner-Take-All Society*, Robert H. Frank and Philip J. Cook, (Free Press, New York, 1995).
- ¹⁸ *Crossing the Chasm*, Geoffrey A. Moore, (HarperBusiness, New York, 1991).
- ¹⁹ <http://raven.stern.nyu.edu/networks/dictionary.html>.
- ²⁰ “Above the Crowd”, Bill Gurley, Credit Suisse First Boston Research, March 20, 1995.
- ²¹ “Increasing Returns and the New World of Business,” W. Brian Arthur, *Harvard Business Review*, July-August 1996.
- ²² For an excellent treatment of how standard-setting alliances are formed, see *The Complexity of Cooperation*, Robert Axelrod, (Princeton University Press, Princeton, 1997), pp. 96-120.
- ²³ *Co-opetition*, Adam M. Brandenburger and Barry J. Nalebuff, (Currency Doubleday, New York, 1996).
- ²⁴ *The Innovator’s Dilemma*, Clayton M. Christensen, (Harvard Business School Press, Boston, 1997).
- ²⁵ *New Rules for the New Economy*, Kevin Kelly, (Viking, New York, 1998).
- ²⁶ “Strategy as a Portfolio of Real Options”, Timothy A. Luehrman, *Harvard Business Review*, September-October 1998.
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- ²⁸ *Renewal: Crafting Strategy through Economic Time* (forthcoming), Jeffrey R. Williams, (Free Press, New York, 1998).

²⁹ *Net.gain: Expanding Markets through Virtual Communities*, John Hagel and Arthur G. Armstrong, (Harvard Business School Press, Boston, 1997).

³⁰ *The Gorilla Game*, Geoffrey Moore, Paul Johnson, Tom Kippola, (HarperBusiness, New York, 1998).

³¹ “Frontiers of Finance—Competitive Advantage Period (CAP): The Neglected Value Driver”, Michael Mauboussin and Paul Johnson, Credit Suisse First Boston Equity Research, January 14, 1997.