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### From Bit Valley to Bitcoin: the NASDAQ Odyssey

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# FROM BIT VALLEY TO BITCOIN: THE NASDAQ ODYSSEY

Mark Lennon, California University of Pennsylvania  
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## ABSTRACT

*Over the past 15 years, NASDAQ, the world's first all-electronic stock exchange, has actively engaged in efforts to serve the global digital economy by expanding its reach beyond its original domestic U.S. market. They have attempted to create a global 24/7 trading platform, to serve customers in the U.S., Japan, and Europe. These efforts have met with varying degrees of success. More recently, the renamed NASDAQ OMX Group has been experimenting with the disruptive fintech (financial technology) Bitcoin and its underlying technology blockchain to develop robust trading solutions, which drastically reduce transaction and record keeping costs. In this paper we analyze the various approaches taken by NASDAQ in its expansion ventures. We describe the similarities and differences in these undertakings, in order to identify successful strategies for firms who desire to increase the quality of their products while increasing efficiency and reducing the costs of their services. Drawing upon the strategy literature, we also develop theoretical models on how markets operate, and derive a series of propositions about the interplay between technology and markets.*

**JEL:** M16, F23

**KEYWORDS:** Bitcoin, Blockchain, NASDAQ, Stock Exchanges, Markets, Disruption

## INTRODUCTION

In June 2000, in a joint venture between the US stock exchange NASDAQ (National Association of Securities) and SoftBank, a Japanese computer conglomerate, a new stock exchange opened in Osaka, Japan. Named NASDAQ-Japan, the new exchange was intended to provide an Initial Public Offering (IPO) friendly environment where Japanese Dot Com startups, heavily concentrated in the "Bit Valley" region of Tokyo, could float stock issues. This new market was also planned to be part of a worldwide chain of NASDAQ exchanges (US, Europe, Japan), wherein participants in the market would have 24/7 access to all three markets (Hanes, 2000). While enjoying initial success, by September 2002 the market ceased operations.

What is intriguing about the NASDAQ-Japan market is that during its foundation, there were concurrently two products being developed, each of which was inherently reliant upon the other for its existence. One product was the IPO shares of the Dot Com startups. To enable their trading, however, another product, the actual stock market itself, was constructed. Once operations of NASDAQ-Japan began though, it shifted from being defined as a Product to that of a Market (Belson, 2000a)

This paper will seek to explain this phenomenon, by first examining the history of the market. From this, a theoretical perspective will be developed in order to understand how markets, market participants, and products help engender, rely upon, and influence one another in the inception, operation, and demise of a market.

We then review subsequent strategic ventures by NASDAQ to expand its operations, including European expansion attempts and more recently, efforts to leverage the recent fintech innovations of Bitcoin and blockchain technology, and analyze parallels and distinctions between these undertakings.

## LITERATURE REVIEW AND BACKGROUND

### NASDAQ-Japan: Opportunity for Market Creation

Six major forces converged to create the opportunity for a new market (NASDAQ-Japan), in order to satisfy the demand for a trading place for a new product (IPO shares). Table 1 summarizes these forces, followed by a description of each.

Table 1: Six Major Forces Converged to Create NASDAQ-Japan

Major Converging Forces for Creation of NASDAQ-Japan	
1.	Japanese investors coveted the high returns on investment attained by US investors in Dot Com IPOs.
2.	The need for capital by Japanese Dot Com startups was not satisfied by the existing Japanese Venture Capitalist system.
3.	Financial de-regulation by the Japanese government facilitated the formation of new stock markets.
4.	NASDAQ desired to create a 24/7 global trading system.
5.	Son Masayoshi, founder and CEO of SoftBank Holdings, sought to replicate his US IPO successes in Japan.
6.	A Market for new IPO friendly stock exchanges had already been created by NASDAQ-Japan's competitors.

*This table lists the six major forces that led to the creation of NASDAQ-Japan*

#### *1. Japanese investors coveted the high returns on investment attained by US investors in Dot Com IPOs.*

Japan has one of the highest savings rates in the world. However, domestic interest rates are extraordinarily low and below those of the US and Europe, between 1 and 2 % (Euromonitor, 2002). Since World War II, these low rates were maintained through the influence of the powerful Ministry of Finance. The Japanese economy was considered to be a ‘bankers paradise’ (Calder, 1993). Even until as recently as 2001, the banks still controlled approximately 64% of all financial-system assets (Vitols, 2001).

The Ministry systematically coerced banks and other financial institutions to use household savings as a cheap source of loans to industry. The low interest rates on these loans facilitated the building of Japan’s manufacturing machine. These cheap commercial loans were the lynchpin of Japan Inc. and allowed large companies to keep unproductive workers in an effort to keep unemployment low (Hirsch, 1998).

In the process of artificially keeping rates of return on savings low, however, Japanese investors were cheated out of a global fair market return. With the bursting of the speculative real estate bubble of the 1980’s, resulting in failures and mergers of numerous banks and financial institutions, the Japanese investor lost confidence in both the banking system and the Ministry of Finance.

Japanese investors were no longer willing to suffer low returns (Kattoulas, 2002). In order to achieve higher returns on their investments, Japanese investors were ready and eager to invest in IPOs of Internet startups. The rapidly aging population, who desired a comfortable retirement and sought to catch up for past lower returns, especially desired these higher returns. These senior savers held over 1,200 trillion Yen (US \$10 trillion) in savings (Royama, 2000). Japanese investors’ eagerness to take on higher risk with better returns, through investment in high technology stocks, is demonstrated by the enormous success of one of the first high tech IPOs. On October 23, 1998, shares in the world’s largest mobile telecommunications company

NTT Docomo were issued on the Tokyo Exchange by its parent corporation NTT (Nippon Telephone and Telegraph.). So popular was this IPO that it was more than twice subscribed (Abrahams, 1998). Just 545,000 shares were issued in Japan only, with an initial offering price of \$33,000. On the first day of trading the share price soared by 20%. It was thought to be the largest IPO ever. (Communications Today, 1998)

*2. The Need for Capital by Japanese startups was not satisfied by the existing Japanese Venture Capitalist System*

Throughout the late 1990's, in Tokyo alone over 1,200 internet related firms had been established (Yonekura & Lynskey, 2000), developing a wide variety of internet technologies and applications. By working independently, these firms sought to avoid the shortcomings of past Japanese collaborative efforts to produce software (Archordoguy, 2000). Most firms were concentrated in the Shibuya District of Tokyo, which was already popular among young people because of its convenient location and relatively low rents. In March 1999, the area came to be known as "Bit Valley" by proclamation of more than 300 entrepreneurs in homage to Silicon Valley (Shuichi, 2000).

This manner of creation of new technologies was quite unorthodox for Japan, as it followed more the American model (R. R. Nelson, ed, 1993). It did not proceed along the established method of development that gave rise to the "Japanese Miracle" - the industrialization and technological advancement of post-World War II Japan (Johnson, 1982). Supporting societal and industrial complementary institutions did not exist (Whitely, 1992). There was no type of overlapping network of corporate resources to draw upon (Gerlach, 1992).

Of most significance, the powerful Ministry of Trade and Industry (MITI) was not a factor. MITI did not engage in government policies wherein target industries were chosen and supported through a consortium of public and private funding (Zysman, 1983). Unlike the past, a combination of governmental and industrial organizations did not develop technologies, industries, and export markets (Freeman, 1987). Rather, like the United States, the formation of these Internet firms was in direct response to the growth in the ecommerce market (Lynskey, 2001).

Due to this fundamental difference in development patterns, conventional sources of Japanese venture capital funds were not appropriate (Suzuki, 2002). Unlike the US equity system of obtaining funding via an IPO, the Japanese venture capitalist system was debt driven. 80% of the typical Japanese startup funds came from various types of debt, such as convertible bonds, warrant bonds and outright loans (Borton, 1992). Because of past tight restrictions by the risk adverse Ministry of Finance, traditional Japanese venture capitalists were limited to subsidiaries of major commercial banks, securities firms, and trading houses (Fingleton, 2000).

Major Venture Capitalists included subsidiaries of the trading giant C. Itoh, Dai-ichi Kangyo Bank, the Long Term Credit Bank and major stock brokerage firms including Nomura and Yamaichi Securities. (In the late 1990's in the midst of the continuing banking crisis, Yamaichi Securities went bankrupt and the Long Term Credit Bank was nationalized and sold to foreign investors. (Shuichi, 2000)) This method of financing was consistent with Schumpeter (1936)'s assertion that banks be the providers of capital in that they can create credit. Unlike their US counterparts, Japanese venture capitalists, with their steady streams of revenue from interest and payments on the debt, were not pressured to rapidly take firms public (Turpin, 1993). Even if the Japanese venture capitalists wanted to quickly do an IPO, they were hindered by the complexities of the Japanese stock exchanges.

Over 90% of all stocks traded in Japan are in the first and second listings of the Tokyo Stock Exchange (TSE). Because of the influence of the securities adverse Ministry of Finance, which preferred startup firms to fund expansion through bank loans, the average age for a firm to go public on the TSE was seventeen

years (Hamlin, 2000), with the process of listing taking two to four years. From a Schumpeterian definition, the founders of these ‘startup’ firms were no longer ‘entrepreneurs’ but rather ‘managers’.

With the coming of the internet age and the accelerated pace of technology and firm creation in a high-velocity markets (Eisenhardt & Martin, 2000), these restrictions on venture capitalists, startups and IPOs were both anachronistic and highly detrimental to Japan’s economic competitiveness. Internet startups, lacking a credit history and history of operations, were viewed warily by the traditional debt driven Japanese venture capitalists. In any event, due to the decade old banking crisis, with banks saddled with a plethora of bad debts, conventional venture capitalist sources of financing were no longer available (Horiuchi, 2000). Financial resources were critical however, for with greater availability of funding, the propensity for entrepreneurs to found firms is higher (Shane, 1996).

### *3. Financial De-Regulation by the Japanese Government facilitated the Creation of New Stock Markets*

On 11 November 1996, Prime Minister of Japan, Ryutaro Hashimoto, instructed the Ministry of Finance to fundamentally reform the Japanese financial system. In the same systematic and gradual manner as advocated by Spicer et al (2000) for the privatization of state owned firms, the Prime Minister, through the progressive implementation of reforms in the commercial code, wanted to create a “free, fair, and global” market and put Tokyo on par with New York and London as a world financial center (Tett, 1998). Modeled after the Anglo-American securities driven system, the idea was to reshape Japan from a bank-based to a capital market-based economy (Kanda, 2000). These reforms, nick named ‘The Big Bang’ were intended to reinvigorate the stagnating economy. Integral to the achievement of these goals was the simplification of the process of IPOs (Horiuchi, 2000).

As a response to the Ministry of Finance’s failure to successfully manage the banking crisis, in June 1998 the Ministry was stripped of its securities oversight power. Further emulating Spicer et al (2000), an ancillary supporting organization was created. The functions of monitoring financial markets were transferred to a newly formed regulatory agency known as the Financial Supervisory Agency (FSA). Separate from the Ministry of Finance, FSA was reportable directly to the Prime Minister. The FSA was much more receptive to the formation of new securities markets (Royama, 2000).

### *4. NASDAQ desired to create a 24/7 global trading system.*

Riding high on its internet IPO successes in the US, in 1999 the US stock exchange NASDAQ sought to build the first global exchange by creating additional exchanges in Japan and Europe (Hanes, 2000). All linked together via a yet to be developed, software trading platform called “SuperMontage”, the intent was to allow the offering, purchase, and sale of US, European, and Japanese stocks to any market participant on any of the three exchanges (Economist, 2002a). Using this trading platform, Japanese entrepreneurs would be able to raise capital directly from foreign sources. In addition to the acquisition of capital, by adopting a ‘global mindset’, the Japanese entrepreneurs could gain additional knowledge, which could be diffused throughout their organization (Hitt, Ireland, Camp, & Sexton, 2001).

Even more appealing was the opportunity for Japanese investors. For the first time they would be able to purchase directly US high tech, particularly Internet, stocks. It was hoped that by tapping into the pools of resources (Penrose, 1959) of international consumer savings, it would give European, American, and especially Japanese investors a more equitable return on their investments (Hadjian, 2000).

To enter the Japanese market, however, NASDAQ lacked several critical resources, and needed a partner firm to obtain them. These resources included knowledge about Japanese Internet startups and the ability to navigate the Japanese bureaucracy, as well as have a familiarity with the American IPO process (Hanes, 2000). Named Forbes Global magazine’s ‘Business Man of the Year 2000’ for his efforts as matchmaker

between Japan and the Internet, Son Masayoshi and his company SoftBank Holdings were the logical choice (Economist, 2002b).

*5. Son Masayoshi, founder and CEO of SoftBank Holdings, sought to replicate his US IPO successes in Japan.*

For a superb description and analysis of SoftBank and Son Masayoshi see Lynskey and Yonekura (2001). The following synopsis is adapted from that paper:

Son Masayoshi, a self-made billionaire, is not your typical Japanese. After inventing and selling to Sharp Corporation a multilingual pocket translator for US \$1 million while still a student at UC Berkeley, Son used the proceeds to found SoftBank Holdings in 1981. Seeing major inefficiencies in the distribution and sales of packaged software in Japan, he seized the opportunity to become a large-scale distributor by consolidating and making more efficient the existing supply chains by identifying, coding, and then implementing routines (Argote, 1999).

From the revenue streams of the software sales, Son horizontally integrated his company by buying up Japanese computer magazines and trade shows. Son viewed his corporation to be similar to that of traditional Japanese firms, a collection of resources to be used to expand operations (Aoki, 1994). Critical to his successful growth, Son recognized a core competency in his ability to leverage revenue streams to expand into new markets (Prahalad and Hamel 1990). Following Nelson (1982)'s practice of 'searching' and 'seeking' for new opportunities, Son further expanded his horizontal integration by purchasing the premier American properties, the computer publisher Ziff-Davis and the tradeshow Comdex. From all these purchases, he was able to generate a steady stream of positive cash flow (Lynskey, 2001).

Realizing the potential of the Internet very early on, and with spare capital available generated by his other business units, Son went shopping in Silicon Valley. By making a few key investment choices (Ghemawat, 1991), SoftBank's strategy was to take stakes in major well known US internet startups, including Yahoo! and E\*TRADE. From an initial investment of approximately US \$900 million, post-IPO these firms were valued at over US \$14 Billion. Expanding venture capital portfolio from this, by July 1999 SoftBank had invested an additional US \$1.7 billion in over 100 Internet startups in both the US and Japan (Tanahashi, 2002).

Having grown wealthy through the rapid public offerings in the US, Son believed that in accordance with his high Absorptive Capacity (Zahra, 2002) of knowledge about new industries, as demonstrated by his previously successful foreign acquisitions, he could duplicate the Silicon Valley model of rapid IPOs in Japan (Aoki, 2001). To accomplish this, however, he needed a stock exchange that was conducive to IPOs. Realizing that he lacked the expertise and knowledge base to create an exchange by himself (Teece & Pisano, 1994), he required a partner with a brand name that would give legitimacy (Wernerfelt, 1984) in the eyes of the international financial community. He found a willing partner in the US stock exchange NASDAQ (Hanes, 2000).

*6. A Market for new IPO friendly stock exchanges had already been created by NASDAQ-Japan's competitors.*

In December of 1999, the existing Tokyo Stock Exchange (TSE) also recognized the opportunity for an IPO friendly stock market. The TSE responded by creating another stock exchange with easier listing requirements than the TSE, to facilitate the IPO's of Japanese Dot Com startups. Called MOTHERS (Market of the High-Growth and Emerging Stocks), this market gained instant legitimacy by touting its relationship to the venerable TSE, and implied that eventually these nascent startups would be financially strong enough to list on the Tokyo second or even more prestigious, first listings (Hadjian, 2000).



Meanwhile, the Japanese OTC (over the counter market) JASDAQ (the Japan Securities Dealers Association – no affiliation with the US NASDAQ) maintained that it was the only tried and true exchange for Japanese high tech IPO's. JASDAQ was an established market, trusted by both Japanese investors and stock traders. For the first time, in an effort to create a mobility barrier to entry (Caves & Porter, 1977) against the competing markets, JASDAQ began to actively advertise (Scherer, 1990), and court startup firms by asserting that by listing with JASDAQ, a startup would earn a certain cachet and approval by the Japanese business community (Hamlin, 2000). These two rivals were not looked at negatively by NASDAQ-Japan, however, as through Brandenburger et al. (1996)'s theory of 'co-opetition', these two markets helped establish the market for new stock exchanges.

### Fleeting Operation of NASDAQ-Japan

The initial success then downfall of NASDAQ -Japan can be illustrated by examining the IPO and subsequent trading of shares of one Dot Com startup, Morningstar, an online Japanese investment information provider (Belson, 2000b). Debuting on June 23, 2000, Morningstar was closely watched, as it was the first SoftBank Capital (the venture capital arm of SoftBank Holdings) investment to go public on the exchange. SoftBank was heavily criticized by its detractors, as the floating of its own IPO on its own market could be seen as a major conflict of interest - a point to be explored later in this paper (Hamlin, 2000).

The initial offering price of Morningstar was 7 million Yen (US \$60,000) per share. 400 new shares were first issued, raising 2.6 billion Yen (US \$22 million) after brokerage fees and expenses. Trading in the shares was active, pushing the price higher. It closed the first day of trading at 8.5 million yen (US \$70,000) per share, which placed the two-year-old firm's market capitalization above many of the old economy, Japanese manufacturing leaders, such as Mitsui Engineering & Shipbuilding (Belson, 2000b).

This successful IPO pleased investors, the startup Company Morningstar, and the venture capitalist – SoftBank Capital. This success was seen as a harbinger of good things to come. However, the good times would not last. By September 2000, with the worldwide fallout in Internet stocks, the share prices of Morningstar had plummeted by 65% (Belson, 2000b). With the continuing decline of Internet startup share prices, and the resultant paucity of IPOs due to lack of demand, NASDAQ-Japan struggled to survive for two years. By September of 2002, NASDAQ-Japan ceased operations after NASDAQ withdrew its name and investment, after having lost over lost over US \$24 million (Belson, 2002).

Due to NASDAQ-Japan's focus on Internet companies for their target market, certainly its troubles were exacerbated by the crash of the dot-com's. However, the exchange's main problem was timing and delay of the commencement of operations. With a whole year since initial announcement until go-live, the exchange lagged its competitors, JASDAQ and the TSE, in entering the space for IPOs. NASDAQ-Japan launched operations right in the thick of the dot-com fallout. Part of the reason for the delay must have been caused by the need to develop the new SuperMontage trading system from scratch, making it impossible for NASDAQ-Japan to make a more expeditious entry into the market.

### NASDAQ's European Activities

NASDAQ-Japan was not the American stock exchange's only overseas venture. In the 1990s, with the rise and proliferation of the common Euro currency, there was a natural convergence towards homogeneous institutional settings of financial markets, which contributed to overcome national barriers, especially in the areas of finance (Giudici & Roosenboom, 2004). However, just like Japan, there were still inefficiencies in how firms gained access to capital. Like the Japanese government before it, both the European Commission and national governments throughout Europe recognized the need for reform of their financial markets, as they realized the inefficiency of raising venture capital in Europe was a competitive hindrance

to European firms in comparison to their U.S. counterparts (European-Commission, 1993, 1995).

Much like the creation of MOTHERs by Japan’s Tokyo Stock Exchange, stock markets geared towards startups, with less stringent listing requirements were established as ancillary markets to the big boards in a dozen or so countries. The first of these was the AIM (Alternative Investment Market) by the London Stock Exchange in 1995. This was followed in the next two years by a series of "New Markets" which included the Nouveau Marché (France), Euro.NM Belgium, Nieuwe Markt (the Netherlands), The Neuer Markt (Germany), and Nuovo Mercato (Italy). Together these New Markets formed an alliance known as Euro.NM and yet maintained independent listing requirements (Schmiedel, 2001). Thus a true pan-European market was not formed (Ritter, 2003).

Meanwhile, in 1996 a group of financial and banking intermediaries formed the EASDAQ (European Association of Securities Dealers Automated Quotation) with the support of the European Venture Capital Association (EVCA), with the aim to “promote the economic development and the innovating activity of young technology firms, looking forward to financing their growth.” (Giudici & Roosenboom, 2004). After an initial expansion in 2000, due to competition from the national markets, the number of listings steadily declined. In an effort to boost business, EASDAQ was acquired by NASDAQ in March 2001 and renamed NASDAQ-Europe (NASDAQ, 2003).

Like NASDAQ-Japan, NASDAQ-Europe sought to gain competitive advantage with its SuperMontage technology and its brand, neither of which were successful. Just like in Japan, timing was also against them as the bursting of the Internet bubble destroyed the need and desire for global IPO offerings. NASDAQ-Europe closed shop in 2004. As for the competing European New Markets, most also closed, and typically followed the path of the German Neuer Markt. Having faced its own technical and financial challenges, it also closed and was absorbed by the Deutsche Borse in 2003 (Ritter, 2003). Table 2 summarizes the three main reasons for NASDAQ’s failures in Japan and Europe.

Table 2: Failure Factors: NASDAQ-Europe and NASDAQ-Japan

Factor	Description
Timing	Focusing on a specific industry sector (Internet companies) at the height of the tech boom led to exchange failure in the dot-com crash.
Technology	The need to develop new technology from scratch caused significant delays in time to market. Overreliance on the yet to be developed SuperMontage trading platform led to delays.
Temerity (Over Confidence)	NASDAQ’s partners in both Japan and Europe over-estimated their abilities to create viable markets.

*This table lists the factors contributing to the failure of NASDAQ-Europe and NASDAQ-Japan.*

Despite the failings of NASDAQ-Japan and NASDAQ-Europe, the management of NASDAQ remained committed to overseas expansion. They finally achieved this objective by successfully acquiring the Nordic bourse group OMX for U.S. \$3.7 Billion in late May of 2007 (Lannin & Ringstrom, 2007). Unlike earlier attempts to enter markets by creating new exchanges and new technologies, or acquiring relatively new participants in the exchange space, this venture was built upon the acquisition of a mature and established network of exchanges, largely based in the Nordic countries. Since then, NASDAQ has been successful in integrating its technology platform and using its brand name and recognition to successfully expand its trading operations globally.

### Bitcoin and NASDAQ

With the success of the OMX acquisition, NASDAQ seems to have regained its confidence in trying new technologies and market offerings, albeit in a more calculated fashion. This has been most recently demonstrated by its various forays with Bitcoin, the all-digital, decentralized crypto-currency launched through a white paper by pseudonymous developer Nakamoto (2008).



One of Bitcoin's key innovations is the creation of a decentralized public transaction ledger, called the "blockchain", which is transparent and immutable, being cryptographically verifiable by all participants in the Bitcoin network. Transactions are denominated in units of its own currency, "bitcoin", so the system is not dependent on any particular national currency or geographic location, being completely digital and international in scope. Built on free open source software, there are no barriers for any party to start participating in the network.

The development path of Bitcoin, and its underlying publicly auditable blockchain database, has had a similar development path as the World Wide Web itself (Folkinshteyn, Lennon, & Reilly, 2015b). Though Bitcoin can be successfully used as a remittance system (Folkinshteyn, Lennon, & Reilly, 2015a), using the bitcoin currency units, the nature of the blockchain enables further uses as well. While bitcoins are required to make transactions on the blockchain, by creating an agreed-upon layer where particular fractions of bitcoins are designated to represent other assets – like shares of stock or titles to real property – the benefits of the blockchain technology can be leveraged to improve the efficiency of other transactions.

In May 2015, NASDAQ OMX announced plans for a pilot project to use Bitcoin's blockchain technology and one such asset-overlay scheme, Open Assets Protocol. This pilot project intends to use the Open Assets Protocol for its Private Market transaction recordkeeping (GlobeNewswire, 2015). Open Assets Protocol is an asset issuance and transfer protocol built on top of the Bitcoin blockchain (GitHub, 2015), and affords the advantages of immutable, non-counterfeit-able, transparent recordkeeping via the blockchain. This is a vast improvement over the currently used manual/spreadsheet process in the Private Market. Unlike NASDAQ's earlier ventures with development of a new trading system, SuperMontage, where a significant operation depended on the successful deployment of a non-existent product, the company is taking a more cautious approach.

First, NASDAQ Private Market is a relatively new marketplace, launched in January 2014, and is quite small (about 75 pre-IPO companies currently participate). This NASDAQ Private Market is perfectly sized to be the test bed for this experiment (Hope & Casey, 2015). Second, the development effort in this case is much more circumscribed, being only a relatively small glue layer on top of the existing and mature blockchain system. NASDAQ OMX has partnered with a Bitcoin startup Chain on this project, and is looking toward expanding the project to other areas depending on the outcome (Orcutt, 2015).

In March 2015, NASDAQ OMX also announced that it has offered to license its X-Stream exchange engine to Noble Markets, a start-up company that plans to open a Bitcoin and other cryptocurrency exchange for institutional investors (Zacks, 2015).

In April 2015, NASDAQ of Sweden approved a bitcoin-based exchange traded note, which successfully launched in May 2015 (NASDAQ OMX Nordic, 2015; Perez, 2015; XBTPProvider.com, 2015b) . Since then, it has occasionally been the highest-volume ETN on the exchange (XBTPProvider.com, 2015a). Table 3 summarizes the uses of Bitcoin and Blockchain by NASDAQ OMX.

The NASDAQ OMX Group is not the only player in the exchange marketplace that is exploring Bitcoin and blockchain technology for asset issuance and tracking. ICE, the parent of New York Stock Exchange, had earlier invested in Coinbase, an exchange, dealer, transaction processor, and wallet provider for Bitcoin, in January 2015 (MarketWatch, 2015). Overstock has filed a prospectus with the SEC in May 2015, aiming to issue a private bond using the blockchain (Metz, 2015). Digital Asset Holdings, a provider of transaction clearing services on top of the blockchain, has recently acquired several startup companies in the Bitcoin arena and is aiming to use the technology to reduce settlement latency (Prisco, 2015). In September 2015, NASDAQ, in a consortium with Citi, Visa, and several other participants, invested \$30 million into Chain, in a Series B round valuing the company at about \$150 million (Shin, 2015).

Table 3: NASDAQ OMX Group’s Ventures with Bitcoin and Blockchain

Organization	Activity	Purpose
NASDAQ Private Market	Use Open Assets Protocol for its Private Market	Increase efficiency and transparency of transactions
NASDAQ OMX partnership with Chain	Chain will develop the software interfaces for use with the Open Assets Protocol	Enable Private Market participants to easily use the technology to make and verify transactions
Noble Markets	Licensed NASDAQ’s X-Stream exchange engine	Create a high-capacity robust Bitcoin exchange targeted at institutional investors
NASDAQ Sweden	ETN (Exchange Traded Note) for bitcoins	ETN (Exchange Traded Note) enables NASDAQ OMX clients to invest in bitcoins as easily as any other traded asset.

*This table lists strategic ventures undertaken by NASDAQ OMX exploring the potential of Bitcoin and blockchain technology.*

By licensing out their own X-Stream core technology to Noble Markets to develop a Bitcoin and other cryptocurrency exchange, NASDAQ OMX Group may also gain expertise in the trading of a new financial instrument without risk of financial or social capital should the new crypto currency exchange fail. This would enable NASDAQ OMX Group to remain competitive with their NYSE rivals who have directly put venture capital into Coinbase’s launch of the first U.S. based Bitcoin exchange.

### THEORETICAL MODELS

This section of the paper develops two models, drawing upon the strategy literature. The first model is that of the specific workings of the NASDAQ-Japan market. Based on this model, a second model of operations of Markets in General is created. From these models, we derive a series of propositions that incorporates our additional findings from Nasdaq’s European and Bitcoin ventures.

#### NASDAQ-Japan Model

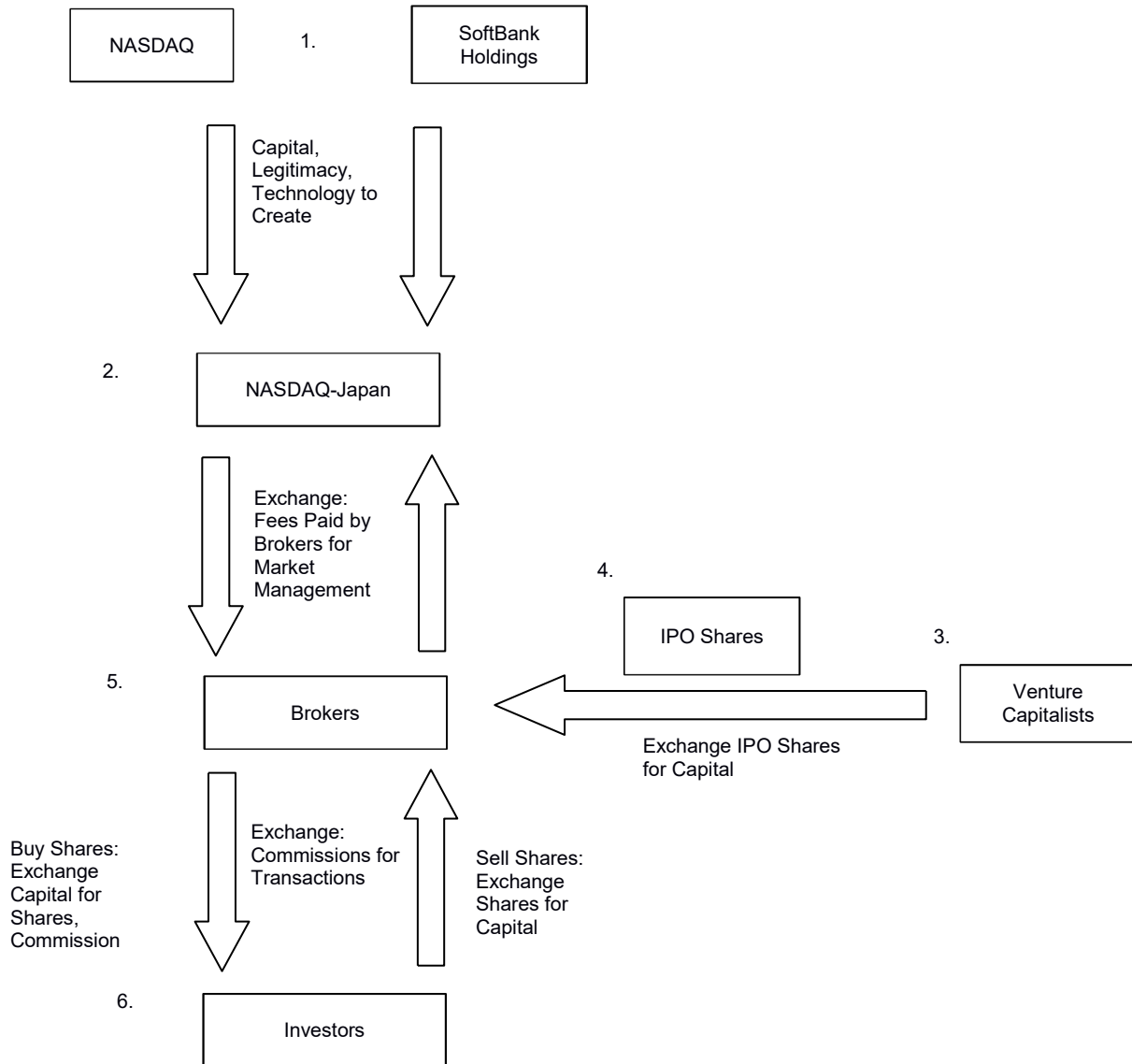
To illustrate the creation and operation of NASDAQ-Japan, a model is drawn in Figure 1. Using a flow chart format, each box represents a Market Participant. Following the Series of Numerals adjacent to each Box, Table 4 tracks the Sequence of Actions that occurred in NASDAQ-Japan.

Table 4: Sequence of Actions Taken by Market Participants in NASDAQ-Japan

Market Participant	Action Taken by Market Participant
1) NASDAQ & SOFTBANK	Combine resources and create
	Combine Resources of Capital, Expertise, Routines, Legitimacy, Technology, etc. to create a new Schumpeterian ‘enterprise’ to fill demand for a new market.
2) NASDAQ-Japan	the new market. To begin trading,
	Begins operations by establishing market mechanisms and governance procedures.
3) VENTURE CAPITALISTS	Begin to produce the Product,
	In exchange for Capital, Venture Capitalists start floating IPO shares.
4) IPO SHARES <sup>1</sup> .	Which are sold to the
	IPO shares are the actual Product traded in the market.
5) BROKERS	Begin selling the shares to the ultimate Consumers, the
	Brokers offer the stock shares, earning a commission on each transaction from their customers, the Investors.
6) INVESTORS	who Buy and Sell the Product (the shares) using the Broker as an intermediary.
	Consumers convert shares back and forth into capital (e.g. buy and sell) in attempts to take advantage of asymmetries of information, which lead to price discrepancies.

<sup>1</sup>Note: IPO Shares are not ‘Market Participants’ but rather a Market Product. *This table lists the interdependent sequence of actions taken by market participants to jump start NASDAQ-Japan.*

Figure 1: Model of NASDAQ-Japan's Market Participants and Sequence of Actions



*This figure represents in graphical form our model of NASDAQ-Japan's market participants and sequence of actions that is described in Table 4.*

As the Market (NASDAQ-Japan) continues to operate, Actions 3 through 6 re-occur in a continuous fashion. More IPO shares are offered by the Venture Capitalists, brought to market by the Brokers, and then traded by the Investors.

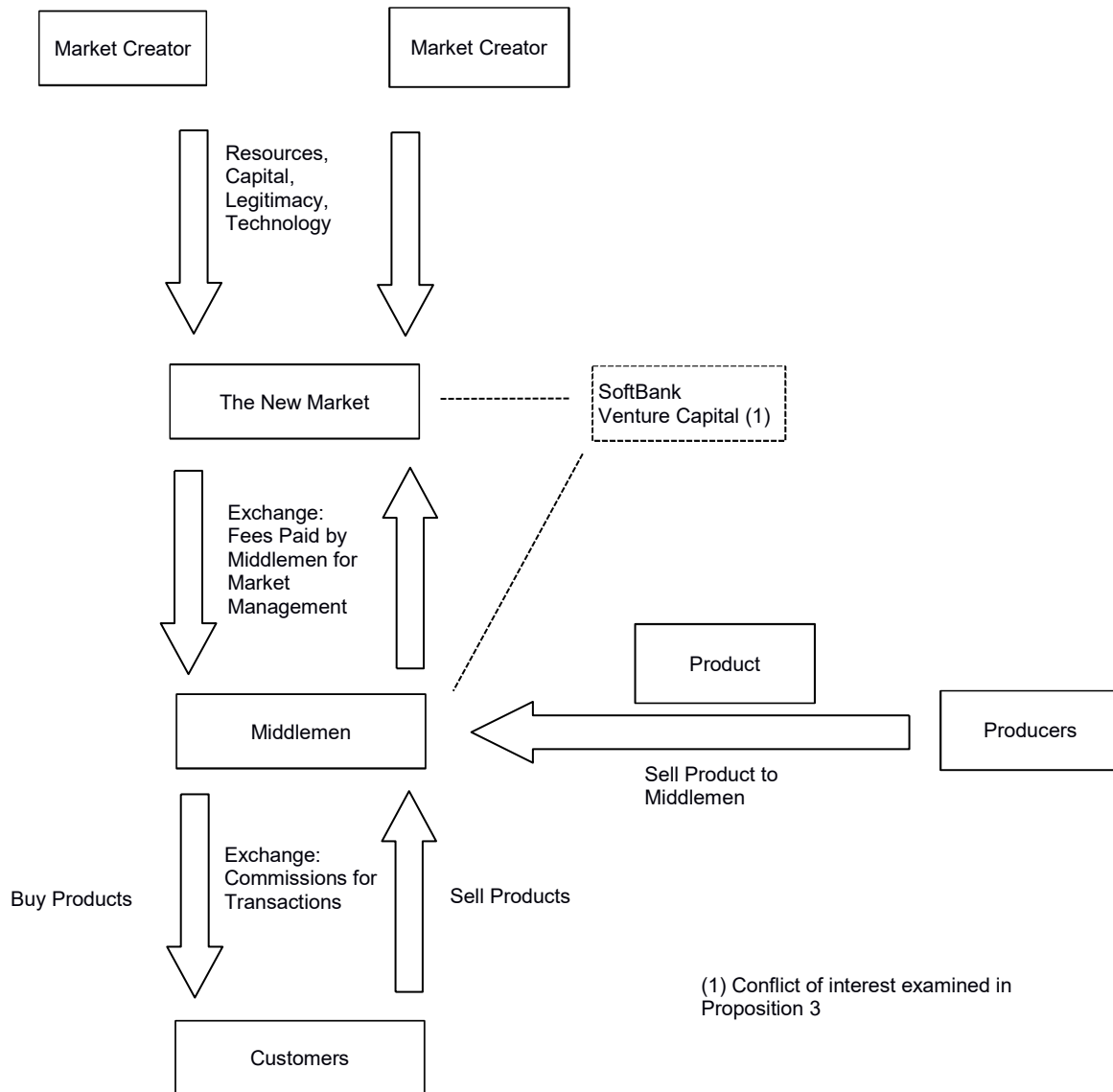
General Market Model

In the succeeding section of this paper, a series of Propositions about the operations of markets in general is posited. To facilitate understanding of these Propositions, a more generalized Model of Market operations is needed. Figure 2 creates this General Model, based on the sequences of Actions by Market Participants as developed in the NASDAQ-Japan specific Figure 1. The terminology used in Figure 2 is extrapolated from the terms used in Figure 1, as listed in Table 5.

Table 5: Terminology Used in describing Models and Propositions:

General Market Terms Used in Figure 2	NASDAQ-Japan Specific Terms Used in Figure 1
Market Creators	NASDAQ & SoftBank
Market Managers	NASDAQ-JAPAN
Market Producers	Venture Capitalists
Market Products	IPO Stocks
Market Middle-Men	Stock Brokers
Market Consumers	Investors

Figure 2: General Model of a Market used to Illustrate Propositions



This figure represents in graphical form the general market model that is delineated in Table 5.

## PROPOSITIONS

Part of the reasons attributable to NASDAQ-Japan's demise is that as the CREATOR, NASDAQ was unable to recognize its routines and tacit knowledge, and then pass these capabilities onto its new creation, NASDAQ-Japan (Nelson 1982). In the day-to-day operations of the new market, NASDAQ took a "hands off" policy in the operations. Instead, NASDAQ relied upon the perceived expertise of SoftBank ((Economist, 2002b). NASDAQ wrongly believed that SoftBank Holdings' past business successes in Japan would compensate for any lack of experience in running a market. SoftBank and Son Masayoshi contributed to this misperception by over-estimating their abilities to adapt into a new business (Teece & Pisano, 1994). In the role of Market Creator, SoftBank was competent as the market could be viewed as another venture capital investment. However, in the role of Market Manager, SoftBank had neither prior knowledge nor organizational understanding to build upon (Argote, 1999).

This situation of mutual misperception was not aided by the nature of the market. In accordance with the conclusions drawn by Eisenhardt (2000), in the hyper-velocity market of Dot Com IPOs, it was quite difficult to identify critical processes because of the time pressures. Instead the Market Managers relied upon knowledge created 'on the fly' from situation specific experiences, which might not be applicable to other situations. If the market for Internet startups had continued to be robust, (e.g. no bursting of the internet speculative bubble) over time the market may have stabilized to be less dynamic and allow time for management to establish "best practices". This leads us to our first proposition:

*Proposition 1: When a firm attempts to duplicate its success in an existing Market, the degree of success in the New Market is positively related to the firm's capacity to identify and replicate Routines and Tacit Knowledge.*

In the implementation of NASDAQ-Japan, NASDAQ also failed to identify a fundamental component of its environment – timely, accurate, and transparent financial statements from firms trading on its exchange (Belson, 2000b). At the time of the founding of the new market, Japanese government financial reporting regulations, compared to the US, were not very strict. Japanese firms were only required to file yearly statements of their financial accounts. Compared with the US SEC (Securities and Exchange Commission) regulations mandating not only annual but also quarterly financial statements, Japanese accounting was far less 'transparent' (Aoki, 2000). These lax Japanese regulations, combined with a lack of historical data (e.g. no operating history), resulted in limited available data for those parties outside the startup firm when going IPO. Therefore, asymmetries of information among the market participants arose. As described by Williamson (1975), this asymmetry put a limit on bounded rationality, which in turn affected the functioning of all market participants.

The Market Manager (NASDAQ-Japan) could not make an accurate judgment whether to allow listing of a startup's stock on its exchange. The Middle-Men (the Brokers) likewise could not make informed decisions regarding the pricing of the stock. This resulted in potential Consumers (the Investors) having great difficulties in making rational buy or sell decisions. From this asymmetry of information, inefficiencies were created, as all participants had to make a 'best guess' in the pricing the Product - the actual IPO shares (Venkataraman, 2000).

Another danger from this asymmetry was the dilemma faced by the Producers (Venture Capitalists) regarding whether or not to deploy short-term strategies (i.e. maximize profits by cashing out quickly) or long-term strategies (i.e. help create a market for their shares). Because of the opaque accounting, the decision variables used by the Producers (Venture Capitalists) were unknown to the rest of the market participants, placing them in a grave disadvantage (Miller, 1992). From this situation, we make our second proposition:



*Proposition 2: The Degree of Asymmetry of information in a market is negatively related with the efficient functioning of Market Participants.*

Another major difficulty that plagued the nascent exchange was SoftBank's inherent and dichotomous conflict of interest, as it attempted to play dual roles in the market. One part of SoftBank, SoftBank Capital – the Venture Capitalist side, acted as a Producer, floating IPO's on the exchange. In this role, SoftBank wanted to obtain as much capital as possible for Internet startup investments by issuing IPO shares at the highest price the market would bear. Simultaneously, SoftBank Holdings, NASDAQ's partner in NASDAQ-Japan, acting as Market Manager, sought to maximize the amount of trading of the new IPO shares, by encouraging IPO share prices to be as low as possible in order to attract investors (Clemens, 1951). This conflict is illustrated in Figure 2.

Because of this dilemma, inefficiency in the Market was engendered as the problem contributed to the difficulty in pricing the Product. For in the Market's hierarchical structure, the individual (i.e. SoftBank Capital) found that own self-interests conflicted with those of the overall organization (Miller, 1992). Perhaps more detrimental however, was that these two opposing desires gave rise to a major moral hazard, as they could only be reconciled by some type of collusion (Brandenburger & Nalebuff, 1996). As there is no evidence of any type of collusion whatsoever, this ongoing problem continued to affect the operations of the Market. From this situation, we derive our third proposition:

*Proposition 3: If a firm attempts to play a dual role in a market, that of Market Manager and that of Market Producer, there is an inherent conflict of interest.*

When NASDAQ-Japan was first launched, a major enticement to participate in the market was the market's connection to the US NASDAQ stock market. In the plan for the 24/7 global exchange, NASDAQ-Japan promised Japanese investors that they would be able to trade US securities and that Japanese Dot Com startups would have access to overseas capital (Economist, 2002a).

These capabilities were to be achieved through the development and implementation of a proprietary software-trading platform called SuperMontage (Economist, 2002a). As neither of the competing Markets (MOTHERs nor JASDAQ) had such a resource, SuperMontage would create a major competitive advantage, as it would be a unique institutional mechanism (Porter, 1991). However, this competitive advantage never materialized due to the failure of the enabling trading technology (McNamee, 2002).

Delayed for over two years and fraught with technical problems, SuperMontage finally arrived in Japan in September 2002, just as NASDAQ had withdrawn from the exchange and NASDAQ-Japan ceased to exist. Japanese investors were never able to trade in US securities so did not profit from the US Internet stock boom (Belson, 2002). From this we make our fourth proposition:

*Proposition 4: Over reliance on a resource that has yet to be created and implemented does not lead to a competitive advantage.*

Clearly SuperMontage was a software technology that was more "vaporware" than software. This over reliance on expected performance was a critical factor in the failings of both NASDAQ-Japan and NASDAQ-Europe.

In sharp contrast, NASDAQ OMX Group took a far more methodical approach in adopting the nascent Bitcoin and blockchain technology. By only incorporating proven aspects of the technology (e.g. the inviolable record keeping aspects of the distributed ledger of the blockchain) as opposed to relying on the viability of depending upon the volatile digital currency Bitcoin, NASDAQ OMX Group has successfully grafted (Lennon, 2008) this new technology onto their existing operations.

## CONCLUDING COMMENTS

Over the past 15 years, NASDAQ, the world's first all-electronic stock exchange, has actively engaged in efforts to serve the global digital economy by expanding its reach beyond its original domestic U.S. market, trying to create a global 24/7 trading platform, to serve customers in the U.S., Japan, and Europe. More recently, the renamed NASDAQ OMX Group has been experimenting with the disruptive fintech (financial technology) Bitcoin and its underlying technology blockchain to develop robust trading solutions, which drastically reduce transaction and record keeping costs. In this paper, we analyze the various approaches taken by NASDAQ in its expansion ventures and describe the similarities and differences in these undertakings, in order to identify successful strategies for firms who desire to increase the quality of their products while increasing efficiency and reducing the costs of their services.

In earlier strategic ventures in Japan and Europe, the company attempted to build from the ground up, creating new exchanges and new technologies to support them, or alternatively acquiring relatively new inexperienced participants in the exchange space. These early ventures failed in part due to unfortunate timing, and in part due to the relative difficulty of successfully building a set of interdependent technologies and acquiring market share at the same time. Subsequently, NASDAQ was successful in European expansion via the acquisition of a mature and established network of exchanges.

In the more recent strategic ventures to leverage recent financial technologies, the company is taking a cautious and restrained approach. Despite the hype surrounding Bitcoin, NASDAQ OMX Group is not betting the bank on this new technology. Instead, compared with its earlier global expansion efforts, this far more prudent experimentation through licensing and relatively small-scale joint ventures has the potential to bring this firm the benefits of Bitcoin and blockchain, without risking its core operations. Clearly the firm does not want another NASDAQ-Europe or NASDAQ-Japan fiasco that was dependent on the success of unproven, or even undeveloped, technology in the form of the SuperMontage platform.

This chastened NASDAQ OMX Group is very shrewdly first looking to supplement, not supplant, their existing businesses and trading platforms with new Bitcoin and blockchain based systems. If this new technology proves successful, NASDAQ OMX, having learned the pitfalls of overreliance on new technology from its European and Japanese misadventures, will be well equipped to integrate Bitcoin and blockchain technologies effectively while maintaining the firm's global competitiveness.

Though we thoroughly analyzed the particular events from NASDAQ's history using a case-study approach, our research is limited in that we only examine a small sample of strategic initiatives. Future research directions may include a collection of a larger cross-sectional sample of similar ventures, in order to conduct a broader data-driven study.

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