

Symposium

Unregulated Stock Markets in Second Life

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SLCapex is a stock exchange owned and operated by “residents” of the online virtual world Second Life. Despite its almost complete lack of regulation and legal protections against fraud or insider trading, issuers were able to raise approximately US\$145,000 from investors, which grew to US\$900,000 in market value before plummeting, resulting in overall investor returns of –71%. Investors in large issuances lost more than investors in small issuances, and small investors experienced more severe losses relative to large investors when more money was at stake, indicating that the market did a poor job of protecting investors from issuers and of providing a level playing field for investors. Theories from financial economics can explain the markets’ poor performance in the absence of regulatory and legal institutions, but they cannot easily explain why issuers were able to raise capital in such a setting.

JEL Classification: G18, L51, M48

1. Introduction

This article examines data on issuer activity and investor returns in the Second Life Capital Exchange (SLCapex), an exchange created and operated by residents of the virtual world Second Life. The exchange is not subject to any rules or regulations other than those imposed by the exchange owners (who themselves are unregulated) and therefore lacks many of the legal and financial reporting institutions common among more familiar exchanges. After describing the structure of the exchange, we evaluate its performance against the three primary goals of the Securities and Exchange Commission (SEC): “to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation.”¹ We find evidence that the markets do a poor job of protecting investors from both issuers and large investors. Our results indicate that real-world regulatory, legal, and financial reporting institutions would have helped issuers raise more capital and that individual investors do a poor job of protecting themselves in the absence of such institutions.

SLCapex has a number of practices that differ substantially from what we see in real-world markets. First, issuers are individual residents of Second Life rather than incorporated entities. Thus, holders of securities issued on SLCapex are claimants on the income of sole proprietors or partners. Second, the markets have no effective provisions mandating reliable

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¹ <http://sec.gov/about/whatwedo.shtml>.

disclosures or prohibiting insider trading, and to the best of our knowledge, no SLCapex issuer has voluntarily chosen to provide audited financial statements.

Despite the unusual characteristics of the exchange, SLCapex has posted some impressive numbers. Over the course of approximately 32 months (from May 2007 to December 2009), 32 different Initial Public Offerings raised slightly under US\$145,000 for issuers. During its heyday, from about November 2007 to March 2008, the market included about 650 active traders holding shares in 24 securities. Traders and issuers collectively held the equivalent of approximately US\$400,000 in cash in their SLCapex bank accounts and US\$900,000 in shares of issuers (as measured by then-current market values). While this money was denominated in Linden dollars, the currency of Second Life, the money was nevertheless very real: Second Life residents are free at any time to sell their Linden dollars for U.S. dollars to other residents on an open exchange. Thus, the capital raised by issuers represents a sincere show of confidence by investors, who are providing capital to people they do not know and who are almost entirely free of legal and regulatory oversight.

To assess how well SLCapex achieves the SEC's stated goal of investor protection, we first analyze the investment performance of those who invested in the shares issued via an Initial Public Offering (IPO) after our data window opened. Assuming that all delisted offerings provided no value to investors after their delisting, the total value-weighted aggregate return to investors was -71% . Only one issuer paid more in dividends than it raised from investors; in aggregate, the cumulative value-weighted average dividend was only 8% of the capital raised. Interestingly, of the five issuers still listed, the market value of shares held by investors as of December 31, 2007, has increased by 115% . Given that the bulk of issuers delisted during our sample window, it seems unlikely that the handful of remaining issuers will be able to sustain their price performance.

Investors' poor aggregate returns might simply reflect unfortunate swings in the fundamentals of the issuers and Second Life's economy. To determine whether returns reflect a failure of the markets to protect investors from opportunistic issuers, we examine how returns vary with issuer characteristics. We are able to explain approximately 40% of the variation in total investor return in delisted firms with a small set of variables. Firms that raise more capital generate lower returns, consistent with a simple strategic model in which issuers are more likely to treat investors poorly when the benefits to dishonesty are larger. Total returns are declining in the percentage of issued shares that are held by the Top 4 non-issuer shareholders, indicating that large investors do not exert effective discipline on their own behalf or on behalf of smaller investors and may even be colluding with the issuer (tacitly or intentionally). Finally, issuers who initially retain more shares (perhaps intending to sell more shares after IPO) generate higher returns. Because retaining shares allows the issuer to benefit directly from high prices, retention may be a credible way of signaling reliable reporting and better prospects, in a mechanism similar to that described by Myers and Majluf (1984).

To examine whether the markets provided a level playing field for investors, we compare the returns of the Top 4 investors in the IPO (by investment size) to the returns of the remaining IPO investors. The Top 4 investors suffered disproportionately high losses (relative to their investment) for firms with small losses, but this loss was more than outweighed by the disproportionate gains enjoyed by issuers with the largest losses. This association indicates that large investors benefited from an unlevel playing field when it counted most.

Overall, this unregulated market does not appear to have achieved the SEC's mandate for investor protection and fair markets and probably hindered issuers' ability to raise capital. In

some ways, this result is not surprising: The weak regulatory and legal environment obviously poses severe problems for investor protection. However, the severe losses are hard to reconcile with the underlying premise of rational financial economics, in which investors accurately anticipate issuers' self-interested actions. Thus, traditional economics would appear to predict a complete failure of issuers to secure capital (Akerloff 1970) or the development of private substitutes for public regulation, such as third-party licensing (Jamal, Maier, and Sunder 2003) or covenants or other protection (Myers and Majluf 1984; Watts and Zimmerman 1986). Instead, contrary to traditional theory, investors chose to provide capital without public or private protections and suffered predictable losses as a result.

Our analysis is subject to several caveats. First, our analysis assumes that delisted firms provided no terminal value to investors, while it is possible that there were payments made outside of our data set. Thus, we may be overstating investor losses. Second, we have no clear counterfactual: We are unable to assess how effectively stronger institutions would have protected investors and encouraged capital formation.

Finally, and perhaps most importantly, we cannot speak directly to the intentions or business actions of the Chief Executive Officers (CEOs). Without reliable data on the financial activities of the businesses the CEOs were managing, we have no way of knowing whether investor losses were due to misrepresentation (intentional or unintentional) or whether money received by CEOs was used to operate a business or diverted for personal gain. Thus, our results and commentary should not be read to suggest that any issuers or investors behaved inappropriately, much less illegally.

The remainder of the article is structured as follows. In section 2 we describe the nature of the Second Life economy in which the SLCapex exchange arose (along with several competing exchanges). In section 3 we describe the history of the exchange, and in section 4 we discuss key details of its structure. In section 5 we discuss the data we use to assess market activity and investor returns. We conclude with a discussion of the implications in section 6.

2. The Second Life Economy

Building Blocks

Second Life is an online software platform created by Linden Lab, a corporation headquartered in San Francisco, with offices in Boston, London, and Amsterdam. Second Life users (called "residents") open accounts free of charge and create digital representations, called avatars, to depict themselves. Second Life may be viewed as a combination of a virtual world, a three-dimensional modeling tool, a platform for electronic commerce, and a social networking site. Second Life gives users a broad range of tools to create their own content within Second Life, and creators retain significant intellectual property rights to their works under the platform's "Terms of Service." Second Life facilitates transactions by providing a digital currency, the Linden dollar (L\$). Residents can transfer Linden dollars to other avatars using a variety of tools, including secure transactions that allow Linden dollars to be exchanged for created content. Linden dollars are initially issued by Linden Lab, but they are tradable for U.S. dollars on an open exchange. Because the Second Life economy is expanding, net demand for the Linden dollar is positive (more people want to buy Linden dollars than want to sell

them). Linden Lab sells as many Linden dollars as needed to maintain an exchange rate of about L\$270–L\$275 per US\$. The social networking features of Second Life (instant messaging, voice chat, friends, and groups) are used extensively for marketing and promotion.²

Economic Drivers

Linden Lab earns the bulk of its income from Second Life residents who wish to control virtual land. A for-profit business can “buy” (literally “license”) a 256 m × 256 m region of virtual land from Linden Lab for an up-front charge of US\$1000 and a “tier” fee of US\$350/month. A user can also buy a developed plot of land from another user in a land auction at a price determined by the open market. Any land ownership requires monthly maintenance fees to Second Life. These charges, which must be paid in U.S. dollars, defray Linden Lab’s cost for the servers used to power all activities in that region of Second Life and the cost of bandwidth to transmit information to residents (as well as providing a return on their intellectual property).

The resident-to-resident economy can be broken into three broad sectors: real estate, consumer, and enterprise. A secondary market for real estate arises because developing and managing owned land require both skill and time. The consumer economy is based on residents’ desires to socialize and own virtual goods. The enterprise sector of Second Life’s economy is driven by the large number of real-world for-profit corporations, not-for-profit organizations, educational institutions, and governmental bodies that use Second Life for marketing, training, outreach, education, social programs, distance collaboration, prototyping, and any number of other uses driven by the enterprises’ strategic goals. Because the costs of such goods and services can run into tens of thousands of dollars (and even six-figure deals are rumored) and because large enterprises need a clear trail of invoices, many enterprises make payments in real-world currencies rather than in Linden dollars.

Second Life Economy

Overall, the Second Life economy has grown significantly since early 2007. Linden Lab reported a number of statistics in January of 2010.³ User-to-user in-world transactions (those involving exchange of Linden dollars) grew from US\$333 million over the course of 2007 to US\$567 million throughout 2009. Given a money supply of US\$26 million, a dollar in circulation changed hands roughly 20 times over the course of the year. Resident-owned land increased from 984 million m² at the end of 2007 to 1.8 billion m² at the end of 2009.

Figure 1 provides a quarterly breakdown of user-to-user transactions. As is apparent, the creation of SLCapex in early 2007 was part of an extremely rapid growth phase, when quarterly transactions jumped from US\$21 million in 2006:III to US\$39 million in 2006:IV and from

² Robert Bloomfield’s interview series on Metanomics (<http://metanomics.net>) includes many discussions of Second Life’s economy. Transcripts for particularly relevant discussions include “Second Life’s Economic Architecture” (November 5, 2007), with Linden Lab then-CFO Gene Yoon (<http://www.slideshare.net/WeAreRemedy/110507-second-lifes-economic-architecture-metanomics-transcript>), and “Virtual Finance” (November 12, 2007), with Second Life resident bankers and the then-CEO of SLCapex (<http://www.slideshare.net/WeAreRemedy/111207-virtual-finance-metanomics-transcript>).

³ See <https://blogs.secondlife.com/community/features/blog/2010/01/19/2009-end-of-year-second-life-economy-wrap-up-including-q4-economy-in-detail>.

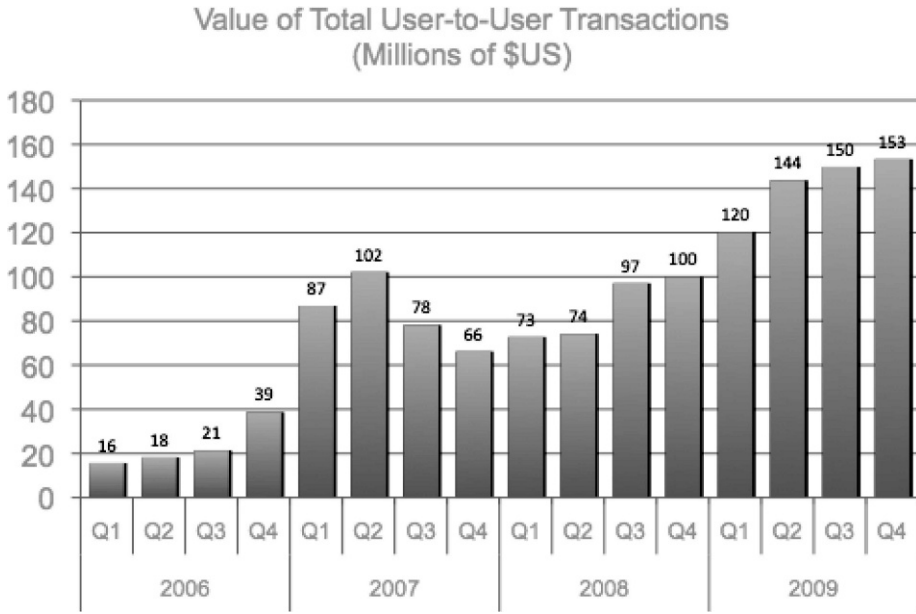


Figure 1. Source: <https://blogs.secondlife.com/servlet/JiveServlet/downloadImage/38-13886-2202/U2Utx-Q409.png>

US\$87 million in 2007:I to US\$102 million in 2007:II. However, this momentum was broken in the summer of 2007 by Linden Lab’s decision to ban in-world gambling, and transactions fell to US\$78 million and US\$66 million in 2007:III and 2007:IV, respectively. The ban on gambling was particularly consequential to many issuers who profited from gambling either directly (by running gambling establishments) or indirectly (by supplying land or other services to gambling establishments or by using the popularity of gambling as a means of reaching a target market). It took until the end of 2008 for user-to-user transactions to break the US\$100 million level, and transactions reached US\$153 million in 2009:IV.

Motivations and Challenges for Second Life’s Financial Sector

Why would anyone attempt to raise capital in Second Life? The first motivation to consider is the same in any economy: to bring those who can execute good business opportunities together with those who can finance them. Consider, for example, a landlord who wished to buy a region of land, develop it, and sell or rent it to others. Purchasing the land entails an up-front cost of US\$1000, and the developer might take weeks or months to develop the land and find renters or purchasers, adding on several hundred more dollars in tier fees. The outlay of funds needed to grow such a business to a reasonable scale is likely beyond the internal capital supply of many Second Life residents. Real-world bankers are unlikely to view kindly a business plan that entails selling virtual land. Thus, raising capital from within Second Life holds the possibility of paying out a lower return to investors who are more familiar with the Second Life economy than one would pay to a credit card company or commercial lender. Issuers can also benefit by raising capital from investors who are actively involved in Second Life and who may take a hand in promoting the business to potential customers. Issuing stock within Second Life might in itself be a savvy marketing move, demonstrating a commitment to

Second Life's future and ensuring coverage in Second Life media outlets. Finally, raising capital within Second Life holds entertainment value.

The challenges of raising capital in Second Life are also severe. Second Life lacks many of the institutions that we take for granted in the real world. Two particularly useful institutions are incorporation and enforceability of claims. Incorporation draws a clear boundary distinguishing the assets and liabilities of the incorporated business from the assets and liabilities of other entities, such as the managers or owners of the corporation, and other businesses that might be related through strategic or other affiliations. Incorporation allows a clear definition of the claims permitted by an equity security, which pertain only to the assets and income of the corporation issuing the security. Enforceability of claims allows the purchaser of a security to pursue legal recourse for any breaches of the contract between security-holder and issuer.

Second Life provides no method of incorporation. As a result, those who wish to raise capital in Second Life have no easy way to separate any equity claims on the assets or income of the business from claims on their personal assets or income, or those arising from other businesses. Moreover, the anonymous culture of Second Life makes legal recourse difficult. Linden Lab has clearly indicated its desire to avoid resolving financial disputes between residents, particularly in cases as complex as those arising in securities transactions. Second Life's account creation process effectively forces residents to adopt a name for their avatar that is not their real-world name.

3. SLCapex

History and Regulatory Environment

SLCapex was originally created in early 2007 as Allenvest International Exchange (AVIX), described in its original prospectus as "a two part company focused on the exchange of stocks and currencies. AVIX is the leading stock exchange in Second Life creating a high quality and secure environment for Second Life Investors AVIX profits by charging a commission on all Stock and Currency trades. We currently take 3% of every stock sale and .5% of every currency sale or purchase."⁴

At the time SLCapex was created, Second Life regulated in-world commercial activity with a very light hand. Representatives of Linden Lab repeatedly emphasized their desire to avoid interfering with in-world commerce or resolving resident business disputes. The sustainability of this policy came into question in the summer of 2007, when Linden Lab was forced to ban gambling activities to comply with U.S. law. The ban was quickly followed by the failure of Ginko Financial, a Second Life bank that was heavily invested in Second Life's gambling sector. Ginko's lack of transparency makes a clear tally unreliable, but *Technology Review* quoted an estimate that depositors were owed US\$700,000 at the time Ginko lowered the daily limit on withdrawals to US\$19 (down from US\$1100); this was followed shortly by a complete shutdown.⁵

⁴ <http://www.slcapex.com/symbol/SLCX/profile>.

⁵ See Talbot, David. The fleecing of the avatars. [and cite to limits]. *Technology Review* (online). Jan/Feb. 2008. Vol. III(1), pp. 58–62. Available at <http://virtuallyblind.com/2007/07/27/ginko-suspends-withdrawals/> for the dollar amount. See also the Metanomics discussion with Second Life resident bankers at <http://www.slideshare.net/WeAreRemedy/011008-virtual-banking-metanomics-transcript>.

The banking sector of Second Life came to an abrupt halt in January 2008, when Linden Lab announced a policy banning the payment of a fixed interest rate by any organization that could not show evidence of oversight by a real-world banking regulator.⁶

Linden Lab's new banking policy had no direct impact on stock exchanges (which did not pay interest on brokerage accounts) or issuers (who were offering variable dividends, not fixed interest rates). However, the ban demonstrated that Linden Lab was willing to impose regulation on financial institutions. Because the threat of regulation can be effective in influencing behavior, we view the ban as marking the end of SLCapex's history as an organization free of regulation.

4. SLCapex Operations

Self-Proclaimed Status

SLCapex refers to itself as: "a FICTIONAL STOCK MARKET SIMULATION operating for ENTERTAINMENT and EDUCATIONAL PURPOSES ONLY, and exists solely in support of Second Life®, a feature-rich online 3-D virtual world including an 'economy' and a 'currency' (\$Linden) operated and supported by Linden Research, Inc."⁷ However, this description as a fictional exchange is not entirely consistent with the fact that participants face the prospect of gaining or losing Linden dollars that are readily convertible into U.S. dollars outside the exchange: "Notwithstanding the warnings herein, SLCapex as designed and offered is a SERIOUS SIMULATION. The participants here PLAY FOR KEEPS and their time and \$Linden-based holdings represent a considerable investment in our community. Your participation here is NOT without risk—You could lose some or ALL of your \$Lindens invested here."⁸

Lawyers may someday determine whether the "simulation" disclaimer could protect the operators of SLCapex from any legal liability (see, e.g., Bradley [2007]). As financial market researchers, we simply observe that participants do indeed "play for keeps," making the markets real (although small) in our eyes.

The CEO as Issuer

Second Life business owners who wish to list on SLCapex present themselves as "CEOs" of the issuing company. While the SLCapex policies identify some corporate governance requirements, the CEO is the resident who receives the proceeds of any IPO and pays dividends to shareholders of record. These events are captured in our database. SLCapex provides no official data on how the CEO disposes of proceeds from the IPO, generates profit from business operations, or transfers money to officers or employees (outside the payment of dividends).

IPOs, Trading, Dividends, and Delisting

Firms raise capital initially through an IPO. To initiate an IPO, a CEO posts a prospectus on the SLCapex Web site and announces a number of shares to be issued, along with a tentative

⁶ <https://blogs.secondlife.com/community/features/blog/2008/01/08/new-policy-regarding-in-world-banks>.

⁷ <http://www.slcapex.com/content/disclosure>.

⁸ *Ibid.*

price. Once the issue is adequately subscribed, shares are transferred to the purchases, and the appropriate amount of cash is transferred back to the CEO. The CEO is permitted to purchase shares as well. Once the IPO is complete, the shares are opened for trading in an electronic limit order book. CEOs issue dividends at their discretion. Firms may be delisted for a variety of reasons, including moving to another exchange, being removed by SLCapex management, or because the CEO simply chooses to delist. These events may or may not involve transfers of cash to shareholders of record at the time of delisting. All cash and share transfers occur using the resident's SLCapex brokerage account.

Financial Reporting

CEOs post a prospectus on the SLCapex Web site and are encouraged to provide announcements about newsworthy events as well. However, SLCapex has no mandated disclosures, and as far as we know, no firm listed on SLCapex disclosed audited financial statements.

5. Empirical Analysis

The goal of our empirical analysis is to assess the degree to which SLCapex achieves key goals identified in the mission statement of the SEC: to protect investors from issuers and to provide a level playing field for all investors, not just those who are large or well-connected. To do so, we first document the overall level of market activity and aggregate returns. Because market returns could simply reflect unfortunate moves in fundamental value, our primary analyses focus on cross-sectional variation. We assess the market failures to protect investors from issuers by examining variation in returns due to issuer characteristics. We assess failures to provide a level playing field for investors by examining variation in returns due to investor characteristics.

Aggregate Market Activity

Figure 2 depicts the number of firms being actively traded. Listings grew rapidly in the spring of 2007, reaching a peak of 24 in March 2008. Listings then declined steadily (to five firms) at the end of 2009.⁹ In Figure 3, the number of active accounts (those showing at least one trade in a 20-day window) mirrors that trend, reaching a peak of about 650 traders in

⁹ On December 25, 2009 (the last day of our sample period), there were five firms actively traded, while 11 firms were still listed on SLCapex. A firm is assumed to be actively traded during the period between the date when the firm's trading was first observed and the date when it was last observed. The remaining six firms are regarded as being inactive because there was no trading record for these firms until December 25, 2009, after their trading was last observed. While the date on which the firm's trading was last observed is our best approximation of the date of delisting, no trading after the last trading date implies either that the firm is delisted or that trading is temporarily halted. Since we cannot identify the date on which the firm was officially delisted, we cannot distinguish between the two possibilities. Of the six firms that were still listed but not traded on December 25, 2009, three firms had their last trading date on December 24, 2009; two firms had their last trading date on December 20, 2009; and one firm had its last trading date on December 16, 2009.

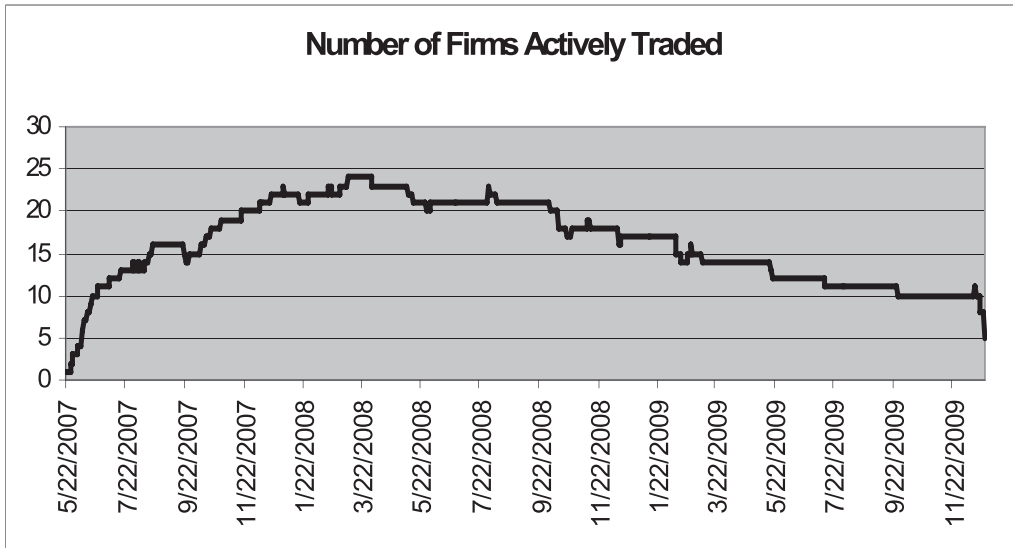


Figure 2. Number of firms actively traded is the number of firms regarded as being traded in the market on each date. We assume that the firm is being traded in the market between the date of its first trading and the date of its last trading (even though the firm may not have a trading record on any day between the two dates). The date of the firm's first trading is the date on which the firm's trading is first observed, and the date of the firm's last trading is the date on which the firm's trading is last observed.

March 2008, which declined to about 100 traders at the end of 2009. Trading volume measured over 15 days (Figure 4) also shows a similar pattern.

Figure 5 depicts the total value of all outstanding shares measured by the number of shares of each listed firm outstanding at each date, multiplied by that date's weighted average stock price. For firms that were delisted, we use a value of 0 because we have no information indicating that investors may have received consideration as part of the delisting. Thus, our measure of market performance is conservative.

Figure 5 shows that total share values in the market rose rapidly in May and June of 2007 to over L\$250,000,000 (approximately US\$920,000). Share values collapsed to a mere L\$50,000,000 (approximately US\$184,000) in August and September of 2007, a result of the banking scandals and gambling ban discussed in section 2. However, total market value recovered, reaching a peak at about L\$275,000,000 (approximately US\$1,000,000) in February 2008. It is worth noting that this peak occurred after Linden Lab announced their strict ban of banks that lacked evidence of real-world regulatory oversight.

Cash held in the market partly reflects a market performance, because both dividends and sales of high-valued securities increase cash balances. However, it also reflects investors' interest in and confidence in the exchange, because the only reason to maintain a cash balance in the SLCapex account is to allow for future purchases. In Figure 6, cash balances showed a substantial spike in August 2007 when a number of traders and CEOs left the World Stock Exchange in response to a scandal and when accounts were imported into SLCapex. Cash balances reached a peak of L\$117,000,000 (approximately US\$430,000) in January 2008, falling substantially in February and March of that year and maintaining a steady balance of about L\$40,000,000 (approximately US\$147,000) until the end of the sample period.

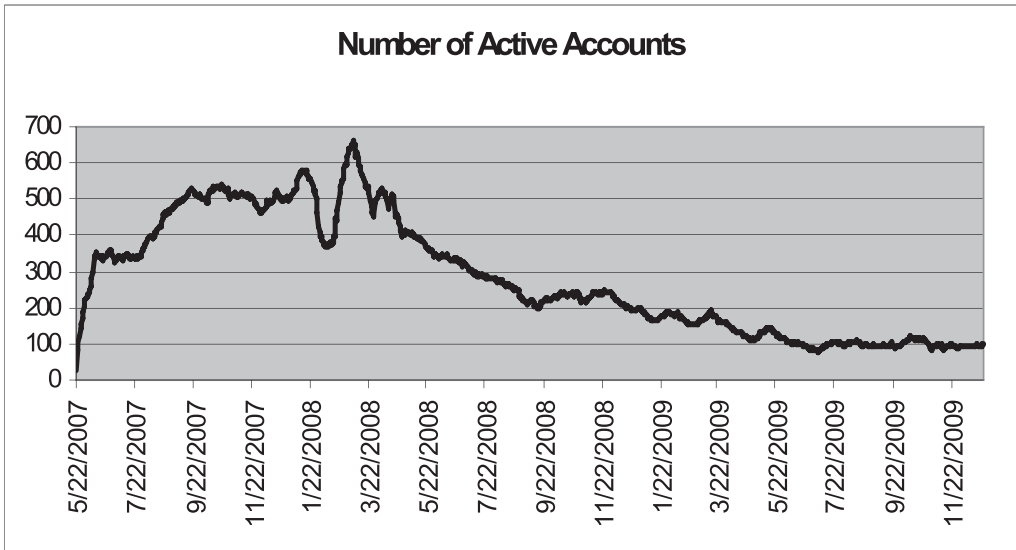


Figure 3. Active accounts are defined as the account users (or traders) who have at least one trading record during the 20-day trading period (i.e., consecutive previous 19 days and the day of status definition [active or inactive]). If an account user continues not to trade for more than the consecutive 20 days, the user is defined as an inactive trader.

While 41 firms, listed or delisted, have ever been traded on SLCapex from the inception of the market, we cannot identify IPO proceeds for the nine firms that were imported from other exchanges. Table 1 lists the 32 companies that raised capital from IPOs on SLCapex. For example, SL Reports.Network (SLR) issued 8,000,000 shares in total during IPO. When the

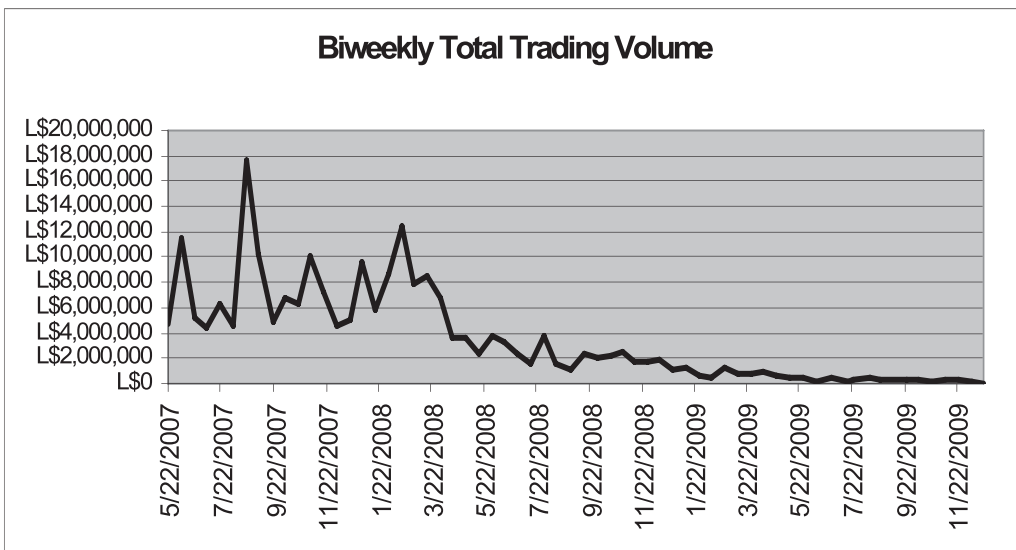


Figure 4. Biweekly total trading volume is the value of all shares traded for 15 days. The value of shares traded is the number of shares traded times the weighted average daily stock price.

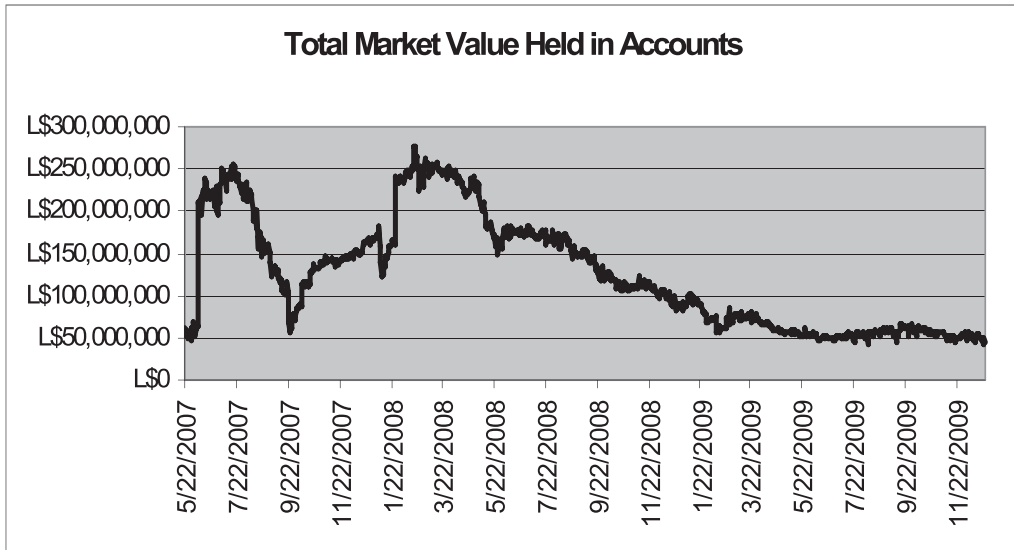


Figure 5. Total market value held in accounts is the sum of the values of all share balance held in every user’s account in the exchange on each date. This is equivalent to the number of all shares outstanding multiplied by the daily stock price. We assume the value of shares of delisted firms is zero. Since the dates on which firms were officially delisted are not available to us, we use the date of last trading as our best approximation of the date of delisting.

shares were issued, 5,200,000 shares were retained by the CEO, and the remaining 2,800,000 shares were sold to outside investors. “IPO Capital Raised” is the Linden dollar amount of cash that a CEO receives by selling shares to outside investors. The CEO of SLR received L\$1,400,000 from outside investors during IPO.

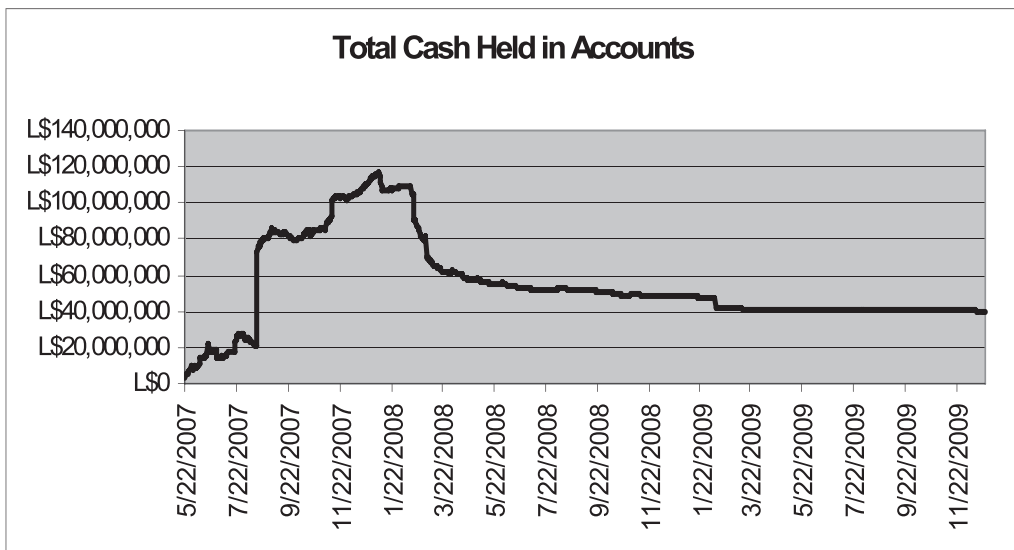


Figure 6. Total Cash Held in Accounts Is the Sum of All Cash Balances Held in Every User’s Account in the Exchange on Each Date

Aggregate Returns to Investors

Before assessing aggregate investor returns, we first note that several issuers exhibit unusual characteristics. For example, Brittany Bay Resorts, Beck Technical Research II, and SL Capital Exchange (all of which were founded by the same CEO) raised zero capital during IPO because the CEO retained all of the issued shares. Phoenix Distribution, Virtual Payment Systems, and Ford Edelman & Co. sold only one share to investors and retained all of the remaining shares. After IPO, the CEOs of these firms transferred significant portions of their shares to other investors at a price of 0 (as recorded in our database) and later bought back the shares by paying cash. Since our measure of investor returns depends on the capital provided during IPO, and because we suspect that investors provided consideration not captured in our data set, we drop these firms from our sample in computing investor returns.¹⁰

To assess aggregate investor returns for each issuer, we construct several categories. First, we identify securities issued by a CEO whose issues are entirely within the sample universe and are all either delisted or are all not (yet) delisted. This is important, because while each security is issued by a single CEO, a CEO may issue multiple securities, and it is very difficult to disentangle data for multiple securities issued by the same CEO. We therefore use the CEO (hereafter called the “issuer”) as the unit of analysis. We then categorize issuers as those who have delisted from the exchange and those who have not (yet) delisted.

To assess investor returns, we use the total capital raised by the issuer as the amount received from other investors.¹¹ The total capital raised includes not only the capital raised in IPO but also the cash received from investors through the selling of shares after IPO. Because the closing stock price is 0 upon delisting, the aggregate cumulative return to investors in delisted issuers consists of only two components: dividends paid and any gains investors might enjoy by selling shares to the CEO. On average, sales to CEOs are relatively small, and in many cases they are negative. Since we cannot easily determine which trades with the issuer reflect additional capital or speculative transactions, we ignore that component of total gain. Thus, the cumulative aggregate return to investors is (total dividends received by investors/total capital raised) – 1.

Panel C in Table 2 presents summary information about all 22 issuers. The equally-weighted average return is 74%.¹² However, this strong performance is undercut by two other observations. First, the overall market-weighted return is far worse: –71%. Second, the positive returns are almost entirely driven by price appreciation of the five firms that have not delisted. As shown in Panel B, prices in those firms have skyrocketed: Even though dividends paid amount to only a quarter of the capital raised, capital appreciation of those firms has allowed a total return of 142% (value-weighted). In contrast, the 17 delisted firms paid dividends amounting to 6% of capital raised; since delisting eliminates all capital appreciation, investors

¹⁰ We initially have 32 companies (owned by 26 CEOs) that raised capital from IPOs on SLCapex. However, to analyze investor returns in Table 2, we first drop six companies (owned by three CEOs) whose IPO process looks unusual, as mentioned above. In addition, we further drop two companies (owned by one CEO) because we cannot determine the delisting status of this CEO; one company is delisted, and the other is listed. As a result, our final sample of delisted CEOs consists of 17 CEOs of 19 companies, while that of listed CEOs consists of five CEOs of five companies.

¹¹ For example, the first issuer in Table 2, whose firm symbol is DGD, received a total of L\$560,638 from other investors; that is, L\$421,052 from IPO and L\$139,586 from trading. However, for the third issuer, whose firm symbol is KDC, the total capital provided is less than the capital from IPO because the CEO paid L\$36,827 back to investors by buying back some shares after IPO.

¹² We do not adjust any returns for risk because we have no idea what risk level is appropriate.

Table 1. IPO Issuers (by Firms)

Issuer (Firm)	Symbol	Total Shares Issued	Shares Held by CEO	Shares Held by Non-CEOs	IPO Capital Raised (L\$)	Date of First Trading	Date of Last Trading	Status
SL Reports.Network	SLR	8,000,000	5,200,000	2,800,000	1,400,000	5/27/2007	12/25/2009	Listed
Dragon Global Diversified	DGD	1,021,052	600,000	421,052	421,052	5/29/2007	1/17/2008	Delisted
CyberSyzygy	CYB	700,000	300,000	400,000	400,000	6/3/2007	8/5/2007	Delisted
Karfeldt & Delgado Capital	KDC	2,000,000	1,010,000	990,000	495,000	6/7/2007	7/12/2009	Delisted
SL CapEx	SLCX	76,000,000	65,000,000	11,000,000	5,500,000	6/9/2007	2/25/2009	Delisted
Bo Beck Group	BBX	1,100,000	600,000	500,000	100,000	6/13/2007	12/31/2007	Delisted
Ginko Perpetual Bonds on AVIX	GPBA	20,000	0	20,000	520,000	6/16/2007	7/31/2007	Delisted
Zhenya Zoning Real Estate	ZEN	2,000,000	1,100,000	900,000	900,000	6/18/2007	12/16/2009	Listed
L&L Financial Services	LNL	7,500,000	4,000,000	3,500,000	2,175,000	6/24/2007	5/13/2008	Delisted
Innovative Inc.	INC	2,499,999	1,500,000	999,999	999,999	7/6/2007	10/2/2008	Delisted
TNW Designs & R.E.	TNW	4,219,990	2,020,000	2,199,990	1,199,995	8/4/2007	4/1/2008	Delisted
Verballis Translation Svc's.	VBL	500,000	425,000	75,000	75,000	8/11/2007	12/25/2009	Listed
Tropical Temptations	XXX	2,250,000	1,150,000	1,100,000	1,100,000	8/15/2007	12/11/2008	Delisted
SL Tronics Media	SLTM	1,500,000	1,200,000	300,000	300,000	8/19/2007	1/1/2008	Delisted
WNB Italian Lands	ITA	10,000,000	7,500,000	2,500,000	2,500,000	9/26/2007	2/19/2008	Delisted
JT Investment Certificates	JTIC	3,000,000	1,000,000	2,000,000	2,000,000	10/8/2007	12/20/2009	Listed
[hoorenbeek]	HBK	4,000,000	3,000,000	1,000,000	1,000,000	10/13/2007	2/14/2009	Delisted
Riot Mechs	MECH	17,841,725	14,000,001	3,841,724	3,841,724	10/18/2007	10/10/2008	Delisted
DreamCities.net	DCTY	1,000,000	150,000	850,000	850,000	11/19/2007	11/12/2008	Delisted
L&L Credit Agency ...	LCA	5,000,000	4,300,000	700,000	700,000	12/8/2007	5/8/2008	Delisted
Wise Property Management	WPM	12,000,000	10,000,000	2,000,000	2,000,000	12/19/2007	2/9/2009	Delisted
MetaNetwork Media	MNM	16,260,000	15,258,000	1,002,000	5,010,000	1/27/2008	8/7/2008	Delisted
Royal Chartered Properties	RCP	9,500,000	8,500,000	1,000,000	1,000,000	3/8/2008	10/19/2008	Delisted
Nestler Investment Corp.	NIC	10,000,000	7,000,000	3,000,000	3,000,000	6/1/2008	12/24/2009	Listed

Table 1. Continued

Issuer (Firm)	Symbol	Total Shares Issued	Shares Held by CEO	Shares Held by Non-CEOs	IPO Capital Raised (L\$)	Date of First Trading	Date of Last Trading	Status
Brittany Bay Resorts	BAY	2,000,000	2,000,000	0	0	7/31/2008	5/17/2009	Delisted
Beck Technical Research II	BTX	2,000,000	2,000,000	0	0	7/31/2008	12/24/2009	Listed
MiLOS Designs	MLS	2,000,000	1,600,000	400,000	400,000	10/25/2008	12/20/2009	Listed
Phoenix Distribution	PHX	20,000,000	19,999,999	1	1	11/10/2008	12/25/2009	Listed
HI-Five™	HIFI	3,750,000	2,250,000	1,500,000	1,500,000	12/15/2008	9/25/2009	Delisted
Virtual Payment Systems	VPAY	12,000,000	11,999,999	1	1	2/22/2009	12/24/2009	Listed
SL Capital Exchange	CAPX	7,600,000	7,600,000	0	0	2/25/2009	12/25/2009	Listed
Ford Edelman & Co.	FED	1,000,000	999,999	1	2	12/15/2009	12/25/2009	Listed

Table 1 lists firms that raised capital from IPO on SLCapex. Firms that executed IPO on other exchanges and were imported to SLCapex are excluded because we cannot identify the amount of capital raised and the CEOs for these firms. Total Shares Issued is the number of shares issued during IPO. Shares Held by CEO is the number of shares retained by the CEO during IPO. Shares Held by Non-CEOs is the number of shares purchased by other investors (non-CEOs) during IPO. IPO Capital Raised is the Linden dollar amount of cash that was paid by other investors (non-CEOs) to purchase shares during IPO. Date of First Trading is the date when the shares of the firm were first traded in the market after IPO. For some firms, it is the date on which their IPO is completed, and for others, it is the date next to their IPO completion date. Date of Last Trading is the date on which the trade of the firm is last observed in the market.

Table 2. Delisted and Listed Issuers (by CEOs)

CEO User ID	Issuer (CEO)	Cash			Dividend Paid (L\$)	Investor Residual Value (L\$)	Dividend Ratio	Investor Return	Top 4 Investor Ownership	CEO Ownership	Date of First Trading	
		IPO Capital Raised (L\$)	Flow from Trading (L\$)	Total Capital Raised (L\$)							Firm 1	Firm 2
Panel A: Delisted issuer												
695462	DGD	421,052	139,586	560,638	-90,421	0	0.16	-0.84	0.71	0.59	5/29/2007	
872614	CYB	400,000	0	400,000	-5714	0	0.01	-0.99	0.82	0.43	6/3/2007	
727294	KDC	495,000	-36,827	458,173	-71,518	0	0.16	-0.84	0.60	0.51	6/7/2007	
622802	SLCX	5,500,000	373,447	5,873,447	-460,035	0	0.08	-0.92	0.56	0.83	6/9/2007	
948734	BBX	100,000	-57,997	42,003	-105,334	0	2.51	1.51	1.00	0.55	6/13/2007	
920362	GPBA	615,997	2475	618,472	-18,339	0	0.03	-0.97	0.47	0.00	6/16/2007	
821406	LCA, LNL	2,875,000	-472,089	2,402,911	-206,768	0	0.09	-0.91	0.47	0.43	6/24/2007	12/8/2007
836630	INC	999,999	-773,284	226,715	-163,835	0	0.72	-0.28	0.42	0.61	7/6/2007	
723834	TNW	1,199,995	20,579	1,220,574	-372,906	0	0.31	-0.69	0.54	0.47	8/4/2007	
734906	XXX	1,656,983	247,697	1,904,680	0	0	0.00	-1.00	0.69	0.51	8/15/2007	
7181578	SLTM, HIFI	1,950,000	-52,560	1,897,440	-17,637	0	0.01	-0.99	0.64	0.63	8/19/2007	12/15/2008
1694710	ITA	2,500,000	-180,729	2,319,271	-120,527	0	0.05	-0.95	0.61	0.75	9/26/2007	
6520718	HBK	1,000,000	-82,095	917,905	-146,680	0	0.16	-0.84	0.45	0.75	10/13/2007	
1471194	MECH	3,841,724	600,684	4,442,408	0	0	0.00	-1.00	0.57	0.78	10/18/2007	
7789846	DCTY	850,000	0	850,000	0	0	0.00	-1.00	0.68	0.15	11/19/2007	
1243526	MNMF	5,010,000	-132,633	4,877,367	0	0	0.00	-1.00	0.48	0.94	1/27/2008	
5651566	RCP	1,000,000	180,506	1,180,506	-133,401	0	0.11	-0.89	0.55	0.89	3/8/2008	
Sum		30,415,750	-223,240	30,192,510	-1,913,115		EW average VW average	-0.74 -0.94	0.60 0.56	0.58 0.70		
Panel B: Listed issuers												
732138	SLR	1,400,000	-122,719	1,277,281	-301,218	841,884	0.24	-0.11	0.78	0.65	5/27/2007	
1140418	ZEN	900,000	-239,886	660,114	-80,506	1,461,848	0.12	1.34	0.85	0.55	6/18/2007	
696154	VBL	75,000	8200	83,200	-4500	2,220,279	0.05	25.74	1.00	0.85	8/11/2007	
9045134	NIC	3,000,000	-2,005,449	994,551	-411,571	2,315,737	0.41	1.74	0.52	0.70	6/1/2008	
8201586	MLS	400,000	-143,978	256,022	-84,613	190,039	0.33	0.07	0.57	0.80	10/25/2008	
Sum		5,775,000	-2,503,832	3,271,168	-882,408	EW average VW average	0.23 0.27	5.76 1.42	0.74 0.70	0.71 0.66		

Table 2. Continued

CEO User ID	Issuer (CEO)	Cash			Investor Residual Value (L\$)	Dividend Ratio	Investor Return	Top 4		Date of First Trading	
		IPO Capital Raised (L\$)	Flow from Trading (L\$)	Total Capital Raised (L\$)				Dividend Paid (L\$)	Investor Ownership	CEO Ownership	Firm 1
Sum	36,190,750	-2,727,072	33,463,678	-2,795,524	EW average VW average	0.25 0.08	0.74 -0.71	0.63 0.58	0.61 0.70		

Panel C: Both delisted and listed firms

Table 2 lists delisted and listed issuers by CEOs. CEO is defined as the user of the accounts that receive cash by selling shares during IPO. We exclude from analysis firms that executed IPO on other exchanges and were imported to SLCapex because we cannot identify the amount of capital raised and the CEOs for these firms. In addition, we further exclude six firms (owned by three CEOs) whose IPO process looks unusual and two firms (owned by one CEO) whose delisting status cannot be determined. As a result, our final sample of delisted firms consists of 17 CEOs from 19 firms, while that of listed firms consists of five CEOs from five firms. We treat the multiple firms run by a single CEO as a single entity because some transactions can be identified only at the CEO level and not at the firm level. Capital Raised is the Linden dollar amount of cash that was paid by other investors (non-CEOs) to purchase shares during IPO. Cash Flow from Trading is the Linden dollar amount of cash that a CEO receives by selling his/her own firms' shares to other investors after IPO net of the Linden dollar amount of cash that a CEO pays by buying back his/her own firms' shares from other investors after IPO. Dividend Paid is the Linden dollar amount of cash that a CEO pays as dividend to the owners of his/her own firms' shares net of the Linden dollar amount of cash that the CEO receives as dividend for his/her own firms' shares during the entire sample period. Investor Residual Value is the value of shares held by investors other than the firm's CEO at the end of our sample period. The value of shares is the number of shares held by non-CEO investors times weighted average daily stock price on the last day of our sample period (i.e., December 25, 2009). The value of shares of delisted firms is assumed to be zero. Total Capital Raised is the sum of IPO Capital Raised and Cash Flow from Trading, representing the total Linden dollar amount of capital provided by investors during the entire sample period. Dividend Ratio is Dividend Paid \times (-1), divided by Total Capital Raised. Investor Return is (total dividends received by investors/Total Capital Raised) - 1 for delisted firms and (total dividends received by investors plus Investor Residual Value/Total Capital Raised) - 1 for listed firms, representing the aggregate return to investor class during the entire sample period. Top 4 Investor Ownership is the proportion of the non-CEO-owned outstanding shares that are owned by the four individuals with the greatest ownership percentage. It is measured as the value of shares held by the four largest non-CEO investors, divided by the value of shares held by all non-CEO investors at the completion of IPO. CEO Ownership is the value of shares held by CEO at the completion of IPO, divided by the value of total shares issued during IPO. Date of First Trading is the date in which the firm's trading is first observed in the market. For some firms, it is the date on which their IPO is completed, and for others, it is the date next to their IPO completion date. EW average is the equally-weighted average and VW average is the value-weighted average.

Table 3. Regression of Investor Return Using the Sample of Delisted Issuers

	Investor Return		
	Coefficient	<i>t</i> -Value	<i>p</i> -Value
Intercept	-0.5834	-2.21	0.05
IPO capital raised	-0.0671	-2.43	0.04
CEO ownership	0.3808	1.96	0.08
Top 4 investor ownership	-0.9727	-2.84	0.02
Early period	0.2587	2.00	0.07
Middle period	0.1485	1.18	0.27
Adjusted R^2	0.4089		
Number of observations	16		

Table 3 shows the results of regression of investor returns using the sample of delisted firms. Dependent variable is Investor Return, which is (total dividends received by investors/total capital raised) - 1, representing the aggregate return to investors during the entire life of firms. We dropped the CEO whose user ID is 948734 (firm symbol: BBX) as an outlier because investor returns are abnormally high relative to those of the other CEOs. For independent variables, IPO capital raised is the Linden dollar amount of cash (in millions) that was paid by non-CEO investors to purchase shares during IPO. CEO ownership is the value of shares held by CEO at the completion of IPO, divided by the value of total shares issued during IPO. Top 4 investor ownership is the proportion of the non-CEO-owned outstanding shares that are owned by the four individuals with the greatest ownership percentage. It is measured as the value of shares held by the four largest non-CEO investors, divided by the value of shares held by all non-CEO investors at the completion of IPO. Early period takes a value of 1 if the firm's Date of First Trade is prior to August 1, 2007, and a value of 0 otherwise (for each firm). Then, the value of this variable is averaged across the firms that belong to the same CEO. Middle period takes a value of 1 if the firm's Date of First Trade is between August 1, 2007, and December 31, 2007, and a value of 0 otherwise (for each firm). Then, the value of this variable is averaged across the firms that belong to the same CEO.

in these securities experienced a 94% loss of their investment. Only one issuer actually paid dividends exceeding capital raised—251% of capital—but on a very low base of only L\$42,003 (0.14% of total capital raised by every delisted CEO, despite representing 5.88% of the CEO population). The second-best dividend ratio of 72% is also a small-sized firm, paid on a base of L\$226,725 of raised capital.

Issuer Characteristics and Returns

With the benefit of hindsight, the market-wide negative returns to investors indicate that SLCapex has transferred a substantial portion of wealth from investors to CEOs. However, further analysis is needed to determine the cause of that wealth transfer. CEOs may have raised capital in good faith and invested the money they received but found themselves unable to generate returns from their businesses. Alternatively, CEOs may have never intended to provide a return to investors, or (combining these two extremes) they may have initially intended to provide a return but decided after raising capital to simply retain the money they received from the IPO.

We cannot directly distinguish between good-faith and bad-faith explanations because we have no reliable information about the disposition of the money transferred from investors to the CEO during the IPO. However, we can get some indirect answers by examining how investor returns vary across the attributes we can observe. Table 3 presents the results of a cross-sectional analysis of the 16 CEOs who raised capital in an IPO and delisted before the end of our sample period. We examine only delisted issuers because these provide a very clean 'round-trip' analysis: We do not need to assume that the closing market price efficiently impounds information about future progress. (If the markets function poorly because of a lack of regulation, this assumption would be invalid.) While our selection of delisted issuers involves

some self-selection and would depress our measure of aggregate returns, we do not see any reason that this should bias our analysis of the cross-sectional variation in returns across this sample.

We regress cumulative investor returns for 15 of the 16 issuers in Table 2, Panel A, onto five variables.¹³ The first variable is the amount of capital raised in the IPO. The more capital raised, the greater the temptation to retain the funds. Even when good behavior is enforced only by the threat of retaliation in reputation-based repeated games, equilibrium outcomes reveal a positive association between temptation and deviation from cooperative outcomes (Dutta and Madhavan 1997). We therefore interpret a negative association between capital raised and investor returns as providing evidence of issuer wealth accumulation.

The second variable we examine is the extent of ownership that the issuer holds at the completion of the IPO. Recall that there is no clear separation between the CEO and the CEO's business. (Because there is no corporate boundary, we could refer to either a CEO or his single firm as an issuer.) Thus, a CEO who retains shares does not transfer cash to a corporation, but simply maintains a direct financial interest in the price of the stock. We would anticipate that CEOs retaining more ownership would therefore be more willing to pay dividends, which maintains investor trust and boosts the stock price at which retained holdings could be sold later.

Third, we measure the proportion of the non-issuer-owned outstanding shares that are owned by the four individuals with the greatest ownership percentage.¹⁴ We see two reasons that ownership would be highly concentrated among a handful of people. If the issuer is raising capital in good faith, a small group of highly interested shareholders could serve as a credible form of corporate governance, because smaller shareholders could rely on the big shareholders to ensure that the issuer is investing IPO proceeds in the business and paying dividends on a timely basis. However, that same ownership profile could also be very helpful to an issuer who is raising capital in bad faith, who would have an interest in finding a small number of large shareholders to collude in providing the illusion of a good-faith business effort.

Finally, we include two variables to indicate key transition periods for the Second Life economy: the market crash of July 2007 and the imposition of banking regulations in January 2008.¹⁵

Our regression analysis shows that investor returns are negatively associated with the amount of capital raised in the IPO, consistent with the theory that receiving more money from investors provides a temptation that is hard to resist.¹⁶ CEO ownership increases returns (which, for these round-trip observations, simply represent payment of dividends), indicating that CEOs who benefit from a high stock price pay dividends to maintain investor confidence. Greater concentration of ownership among the Top 4 investors is negatively associated with investor returns, indicating that these investors are more likely to be colluding with the CEO than serving as effective governance devices. Finally, we show that the best-performing firms

¹³ We dropped BBX as an outlier. It is the only issuer that provided a return to investors, raised the smallest amount of capital, and is wholly owned by four non-CEO shareholders. Its extremity in both our dependent and three independent variables would cause it to have a disproportionately large influence on our parameter estimates.

¹⁴ In our sample, CEOs have the greatest ownership percentage at the completion of IPO except for two cases: We have one CEO who is ranked in the second place and another CEO who sells all the shares to other investors during IPO.

¹⁵ If an issuer has two firms whose date of first trading belongs to two different time periods, we simply take an average of the variables. For example, for the CEO who founded both LCA and LNL, the values of Early Period and Middle Period are 0.5 and 0.5, respectively.

¹⁶ For regression analysis, we scaled the amount of capital raised in the IPO by LS1,000,000.

were those that were listed in the earliest days of the market, reflecting the relatively poor late performance of the market.

Investor Characteristics and Returns

To assess whether SLCapex provides an unlevel playing field that favors large investors, we examine the cash flow realized by the four largest investors in each round-trip issuance, relative to the other IPO investors. As shown in Table 4, the Top 4 IPO investors in each firm lost L\$10,471,280, slightly less than the L\$11,606,632 lost by the other investors, despite the fact that the former provided the majority of capital (60% equally weighted, 56% value weighted). To assess the nature of the large investors' apparent advantage, we divide the aggregate cash flow to the total IPO investors into the cash flow each group would receive had the cash flow been proportional to IPO capital provided. We define the adjusted cash flow as the realized return minus the proportional cash flow, and we define the adjusted cash flow ratio as the adjusted cash flow divided by the proportional cash flow.

Table 5 presents proportional and adjusted cash flows to the Top 4 and non-Top 4 investors, ranked by total cash flow to IPO investors. The adjusted cash flow is negative for the Top 4 investors for 10 of the 16 issuers with more than one investor, implying that their proportion of cash flows was less than their proportion of investment. This result is not statistically significantly different from an even split ($p > 0.20$, two-tailed). However, Table 5 indicates that the Top 4 investors did relatively well for the firms with the largest losses. Adjusted cash flows to the top investors were negative for eight of the nine issuers with the smallest losses (and the one with a small gain), but they were positive for five of the seven issuers with the largest losses. The regression analysis reported in Table 6 demonstrates the association between the relative performance of the Top 4 investors and the size of the IPO. Whether the dependent variable is adjusted cash flow or the adjusted cash flow ratio, we find that the Top 4 IPO investors perform disproportionately better when the firm raises more IPO capital in total. This result indicates that the market does not provide a level playing field but rather that large investors use their advantages only when the stakes are high.

For completeness, we also examine the performance of investors who did not participate in the IPO. As shown in Table 4, non-IPO investors lose a substantial amount of money (though less than either group of IPO investors). Table 7 provides evidence that these investors trade very actively, transferring over L\$90 million among themselves as well as buying shares from the issuers and IPO investors. However, the magnitude of their losses is difficult to assess because we have no clear measure of the amount of capital these investors provided. (We do not believe that the value of shares purchased in short-term speculative trading is a good measure of capital provided.)

6. Discussion

We document that CEOs issuing securities on one of the largest and most active stock exchanges in Second Life, SLCapex, raised almost US\$145,000 from investors but returned only a fraction of that money in dividends. While a handful of firms remain on the exchange and still hold the promise of future dividends, we do not see strong reasons to be confident that

Table 4. Cash Flow to Investors of Delisted Issuers

Issuer (CEO)	Transaction Fee (L\$)		CEO		Top 4 IPO Investors		Non-Top 4 IPO Investors		Non-IPO Investors	
	No. of Obs.	Cash Flow (L\$)	No. of Obs.	Cash Flow (L\$)	No. of Obs.	Cash Flow (L\$)	No. of Obs.	Cash Flow (L\$)	No. of Obs.	Cash Flow (L\$)
DGD	1	449,164	4	184,300	16	73,033	388	-816,546		
CYB	1	374,286	4	-444,589	7	34,473	127	-14,125		
KDC	1	361,905	4	-114,905	20	56,826	443	-434,162		
SLCX	1	5,413,412	4	-540,674	99	-2,126,341	1095	-3,525,729		
BBX	1	-68,331	1	62,530			390	-118,779		
GPBA	1	458,136	4	-151,245	26	-57,983	82	-290,301		
LCA, LNL	1	2,161,143	4	-134,564	92	-1,782,213	458	-440,188		
INC	1	32,881	4	-101,562	86	-36,239	307	41,233		
TNW	1	817,668	4	-561,786	106	230,347	326	-626,323		
XXX	1	1,292,697	4	-720,352	55	-285,756	321	-396,608		
SLTM, HIFI	1	1,639,803	4	-728,694	86	-932,627	263	-140,891		
ITA	1	2,073,743	4	-1,598,747	148	-524,175	157	-102,566		
HBK	1	721,225	4	-366,173	86	-64,978	275	-417,318		
MECH	1	4,346,365	4	-2,866,072	278	-1,456,525	220	-226,179		
DCTY	1	807,500	4	-197,416	62	-1,010,403	243	184,895		
MNM	1	4,727,067	4	-1,530,475	184	-3,432,871	173	-9533		
RCP	1	997,105	4	-660,855	41	-291,201	89	-117,267		
Sum	17	26,605,769	65	-10,471,280	1392	-11,606,632	5357	-7,450,388		

Table 4 shows cash flow performance of the four investor groups of delisted firms during the entire firm life. For CEOs, Cash Flow is cash received from the sale of shares during IPO + cash received from the sale of shares after IPO - cash paid for the purchase of shares after IPO - net dividend paid (i.e., dividend paid to shareholders - dividend received for the shares that the CEO retains) - IPO transaction fee. For non-CEOs, Cash Flow is cash received from the sale of shares after IPO - cash paid for the purchase of shares during and after IPO + dividend received. CEO is defined as the user of the accounts that receive cash by selling shares during IPO. Top 4 IPO investors are the four non-CEO investors who purchased the largest number of shares during IPO, and Non-Top 4 IPO investors are the remaining non-CEO investors who purchased shares during IPO. Non-IPO investors are non-CEO investors who did not purchase shares during IPO but who purchased them after IPO. Sum of cash flows to each investor group is zero after adjusting transaction fees. No. of Obs. indicates number of observations.

Table 5. Proportional and Adjusted Cash Flow of Top 4 and Non-Top 4 IPO Investors

CEO User ID	Issuer (CEO)	Total IPO Investors				Top 4 IPO Investors				Non-Top 4 IPO Investors			
		Investors	Cash Flow (L\$)	Proportion	Ratio	Proportional Cash Flow (L\$)	Adjusted Cash Flow (L\$)	Proportion	Ratio	Proportional Cash Flow (L\$)	Adjusted Cash Flow (L\$)	Proportion	Ratio
695462	DGD	20	257,333	0.71	0.01	182,748	1552	0.01	0.29	74,585	-1,552	-0.02	
948734	BBX	1	62,530	1.00									
727294	KDC	24	-58,079	0.60		-35,033	-79,872	-2.28	0.40	-23,046	79,872	3.47	
836630	INC	90	-137,801	0.42		-57,222	-44,340	-0.77	0.58	-80,579	44,340	0.55	
920362	GPBA	30	-209,228	0.47		-97,521	-53,724	-0.55	0.53	-111,707	53,724	0.48	
723834	TNW	110	-331,439	0.54		-179,750	-382,036	-2.13	0.46	-151,689	382,036	2.52	
872614	CYB	11	-410,116	0.82		-335,815	-108,774	-0.32	0.18	-74,302	108,774	1.46	
6520718	HBK	90	-431,151	0.45		-192,138	-174,035	-0.91	0.55	-239,012	174,035	0.73	
5651566	RCP	45	-952,055	0.55		-525,440	-135,414	-0.26	0.45	-426,615	135,414	0.32	
734906	XXX	59	-1,006,108	0.69		-693,949	-26,404	-0.04	0.31	-312,160	26,404	0.08	
7789846	DCTY	66	-1,207,819	0.68		-815,900	618,485	0.76	0.32	-391,919	-618,485	-1.58	
7181578	SLTM, HIFI	90	-1,661,320	0.64		-1,059,928	331,234	0.31	0.36	-601,392	-331,234	-0.55	
821406	LCA, LNL	96	-1,916,778	0.47		-902,260	767,696	0.85	0.53	-1,014,518	-767,696	-0.76	
1694710	ITA	152	-2,122,922	0.61		-1,303,100	-295,647	-0.23	0.39	-819,822	295,647	0.36	
622802	SLCX	103	-2,667,016	0.56		-1,484,038	943,364	0.64	0.44	-1,182,978	-943,364	-0.80	
1471194	MECH	282	-4,322,597	0.57		-2,481,243	-384,829	-0.16	0.43	-1,841,354	384,829	0.21	
1243526	MNMI	188	-4,963,346	0.48		-2,368,530	838,055	0.35	0.52	-2,594,816	-838,055	-0.32	
Sum		1457	-22,077,912			-12,349,120	-1,815,310			-9,791,322	-1,815,310		

Table 5 shows proportional and adjusted cash flow to Top 4 and non-Top 4 IPO investors. Top 4 IPO investors' proportional cash flow is the total cash flow to IPO investors (both Top 4 and non-Top 4 IPO investors) during the entire firm life, multiplied by the proportion of the shares that the Top 4 IPO investors purchased among the shares purchase by both Top 4 and non-Top 4 IPO investors. Top 4 IPO investors' adjusted cash flow is cash flow to Top 4 IPO investors during the entire firm life (in Table 4) - their proportional cash flow. Top 4 IPO investors' ratio is the ratio of Top 4 IPO investors' adjusted cash flow to the absolute value of their proportional cash flow. Non-Top 4 IPO investors' proportional cash flow, adjusted cash flow, and ratio are defined in the same way.

Table 6. Regression of Top 4 IPO Investors' Cash Performance

	Adjusted Cash Flow			Ratio of Adjusted Cash Flow to Proportional Cash Flow		
	Coefficient	<i>t</i> -Value	<i>p</i> -Value	Coefficient	<i>t</i> -Value	<i>p</i> -Value
Intercept	0.4682	0.71	0.49	-0.9983	-0.63	0.54
IPO capital raised	0.2289	3.33	0.01	0.4016	2.41	0.04
CEO ownership	-0.9884	-2.04	0.07	-1.5160	-1.29	0.23
Top 4 investor ownership	0.2680	0.31	0.76	2.5076	1.22	0.25
Early period	-0.3218	-1.00	0.34	-0.7832	-1.00	0.34
Middle period	-0.5483	-1.74	0.11	-0.7092	-0.93	0.37
Adjusted R^2	0.3753			0.1238		
Number of observations	16			16		

Table 6 shows the results of regression of Top 4 IPO investors' cash performance using the sample of delisted firms. We use two dependent variables: Top 4 IPO investors' adjusted cash flow and the ratio of adjusted cash flow to proportional cash flow. Top 4 IPO investors' adjusted cash flow is actual cash flow to Top 4 IPO investors during the entire firm life – their proportional cash flow. Top 4 IPO investors' proportional cash flow is the total cash flow to IPO investors (both Top 4 and non-Top 4 IPO investors) during the entire firm life \times the proportion of the shares that the Top 4 IPO investors purchased among the shares purchase by both Top 4 and non-Top 4 IPO investors. As independent variables, IPO capital raised is the Linden dollar amount of cash that was paid by non-CEO investors to purchase shares during IPO (in millions). CEO ownership is the value of shares held by the CEO at the completion of IPO divided by the value of total shares issued during IPO. Top 4 investor ownership is the proportion of the non-CEO-owned outstanding shares that are owned by the four individuals with the greatest ownership percentage. It is measured as the value of shares held by the four largest non-CEO investors divided by the value of shares held by all non-CEO investors at the completion of IPO. Early period takes a value of 1 if the firm's Date of First Trade is prior to August 1, 2007, and a value of 0 otherwise (for each firm). Then, the value of this variable is averaged across the firms that belong to the same CEO. Middle period takes a value of 1 if the firm's Date of First Trade is between August 1, 2007, and December 31, 2007, and a value of 0 otherwise (for each firm). Then, the value of this variable is averaged across the firms that belong to the same CEO.

those stock prices reflect an accurate expectation of future dividends. We use cross-sectional variation in returns to assess the extent to which SLCapex protects investors from issuers and small investors from large investors. We find the market performs poorly on both counts: Issuers who raised more capital and had a high concentration of ownership among a small coterie of investors provided smaller returns to investors, indicating that the CEOs succumbed to the temptations provided by larger possible gains and may have colluded with their major investors as a method of raising additional capital from outsiders. Large investors achieved disproportionately strong (or less weak) returns for the largest firms, indicating that they took advantage of their size and connections when it mattered most.

Our analysis is subject to a number of caveats. We have reliable data (we believe) regarding the cash and share transactions that occurred on the SLCapex exchange. However, we have no reliable data on what CEOs did with the money they received. They may well have invested the money into their businesses in good faith, and the low investor returns may reflect poor business strategies, poor execution, or bad luck. We may have underestimated investor returns, because there may have been transfers of cash or other assets from CEOs to investors outside the exchange. However, we doubt such transfers could be large enough to have made investment in SLCapex issuers a profitable decision for an investor who did not have a close association with a CEO (either to provide oversight or to collude), and we see no reason that these data problems would be correlated with the variables we use in our cross-sectional analysis. As a result, they seem more likely to reduce the power of our analyses than to bias our coefficients and distort our conclusions.

Table 7. Purchase Activity of Non-IPO Investors

Issuer (CEO)	Purchase from CEO (L\$)	Purchase from Top 4 IPO Investors (L\$)	Purchase from Non-Top 4 IPO Investors (L\$)	Purchase from Non-IPO Investors (L\$)
DGD	778,927	2,765,562	511,065	5,409,539
CYB	0	667,415	134,351	424,934
KDC	105,275	833,557	484,103	6,532,253
SLCX	2,803,897	5,691,388	10,342,252	40,314,702
BBX	2,161,462	220,200	0	13,040,988
GPBA	43,502	72,216	401,045	416,817
LCA, LNL	141,919	1,694,137	4,628,368	4,078,623
INC	13,597	649,315	1,539,162	2,222,007
TNW	62,063	7,737,329	2,003,550	3,805,855
XXX	1,041,518	1,447,515	831,819	1,943,920
SLTM, HIFI	0	473,188	925,663	4,103,087
ITA	0	363,724	1,037,022	400,630
HBK	0	533,620	2,136,686	1,829,882
MECH	1,476,063	405,414	2,269,786	1,734,577
DCTY	0	1,251,147	5,745,548	1,512,732
MNM	0	1,824,906	4,489,643	2,820,440
RCP	95,675	333,700	441,115	92,768
Sum	8,723,897	26,964,333	37,921,178	90,683,754

Table 7 shows the share purchase activity of non-IPO investors. Non-IPO investors are non-CEO investors who did not purchase shares during IPO but purchased them after IPO. Purchase from CEO is the Linden dollar amount of cash that the non-IPO investors paid to CEOs to purchase shares from them after IPO. Purchase from Top 4 IPO investors is the Linden dollar amount of cash that the non-IPO investors paid to the Top 4 IPO investors to purchase shares from them after IPO. Purchase from non-Top 4 IPO investors is the Linden dollar amount of cash that the non-IPO investors paid to the non-Top 4 IPO investors to purchase shares from them after IPO. Purchase from non-IPO investors is the Linden dollar amount of cash that the non-IPO investors paid to the other non-IPO investors to purchase shares from them after IPO.

It is perhaps not surprising that investors who contributed capital to issuers fared poorly. There was no body of financial reporting regulation to guarantee reliable information to investors. Disclosure was entirely voluntary, and to the best of our knowledge, voluntary disclosures were never supported by independent audits. There was no body of corporate law that would ensure a clear distinction between management and the business being managed, nor was there a reasonably effective set of governance devices with which to discipline CEOs. Investors also lacked a credible means of pursuing redress for breach of contract or other CEO behaviors that might be actionable, because CEOs retained a great deal of anonymity, and the amounts at stake, while very large in comparison to incentives used in experimental economics, were too small to justify the expense of determining the real-life identity of the CEO (who might live anywhere in the world) and pursuing legal action (which might well be unsuccessful).

Given the weakness of the regulatory, reporting, and legal institutions, it is more surprising that investors provided any capital at all to issuers. A fundamental premise of traditional models of financial markets is that investors will protect themselves by choosing not to provide capital (or demanding adequately high returns) in the absence of reliable information and effective governance (Akerloff 1970). Investors in Second Life clearly did not do so. While investors may have simply viewed Second Life's investment opportunities as a form of entertainment, the irate tenor of blog postings upon each new scandal and delisting would suggest that investors have an unusual notion of 'fun.' We believe it is more likely that investors exhibited a failure to protect themselves from adverse selection—a result commonly observed in laboratory settings (Forsythe, Lundholm, and Reitz 1999).

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