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股票分拆与内幕人交易

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摘要

本文利用每日交易、内幕交易和高频买卖价差数据，研究股票分拆和内幕交易对香港市场股票价格的影响。我们发现股票分拆对价格有正面影响，这一结果可归因为股票分拆传达了利好信号、并改善了股票的流动性。其次，我们发现在分拆公告前三到四个月以及分拆后的一段时间内，内幕交易活动异常频繁。考虑到公司一般在公告前数月做出股票分拆的决定，这一现象意味着基于私人信息的内幕人交易先行于信息的公开披露。最后，本文发现内幕交易和股票分拆结合在一起可导致显著正的累积异常收益。总体而言，我们的结果表明上市公司利用股票分拆作为旨在增加流动性、且将公司股价调整至最优交易区间的一种信号机制。

关键词：股票分拆、内幕人交易、流动性、信号
中图分类号：F721.5、F83

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一、引文

股票分拆是能够向外部人传递信号并有助于改善公司流动性，还是仅仅是非实质性的公司事件？尽管许多研究都研究过股票分拆的作用，实证结果并不一致，争议依然存在。例如，虽然早期基于美国市场的研究没有发现股票分拆后存在异常股价表现（Fama, Fisher, Jensen, and Roll, 1969），但近期的很多研究却发现市场对于股票分拆公告有显著反应（McNichols and Dravid, 1990; Ikenberry, Rankine, and Stice, 1996; Byun and Rozeff, 2003）。在已经提出的几种解释股票分拆现象的假说中，最流行的是信号假说、流动性假说以及最优交易区间假说。其次，尽管对美国市场中的股票分拆有大量的研究，针对其它市场的研究甚为鲜见。仅有的一些研究包括Kryzanowski and Zhang（1993）对加拿大市场的研究，以及Kunz and Rosa-Majhensek（2008）对瑞士市场的研究。这些研究显示股票分拆的作用随不同市场和不同样本时期而变化。

本文检验股票分拆在香港市场中的作用，旨在确定何种理论最适合解释香港市场的股票分拆现象，并对股票分拆前后发生的内幕交易进行研究。本文具体考虑了股票分拆的三个问题：股价表现，公司流动性和内幕交易活动。本文首先应用市场模型和控制样本配对模型，通过衡量异常收益率确定市场对股票分拆的异常反应。其次，本文利用高频买卖价差数据建立基于买卖价差和深度的流动性指标，并且比较了分拆前后这些流动性指标和成交量的变化。第三，本文分析了围绕股票分拆公告日前后的内幕交易活动。最后，本文进行了回归分析，以找出解释股票分拆背后逻辑依据的最佳假说。

本文对于相关研究有以下几方面的贡献。它扩展了股票分拆在另一个重要的股票市场——香港市场的实证依据。作为世界上最大的证券市场之一，以及亚洲第二大的证券市场，香港市场提供了可跻身世界前列的服务效率和金融基础设施体系。Wu and Chan（1997）研究1986年到1992年的数据后发现，香港市场对于股票分拆存在显著的正面反应，不过他们关注的是分拆的估值效应和分拆因子的确定；本文则采用了更大、更新的样本研究流动性假说、信号假说和最优交易区间假说各自的解释能力。本文通过使用高频交易数据，进一步支持了流动性假说。股票流动性有两个不可分的维度：价格维度和规模维度。以往研究集中于流动性的价格维度，只揭示了流动性的一部分。香港市场交易数据具有的微观结构特征给我们提供了同时估计流动性两个维度的机会，这可以弥补以往研究的不足。本文在测算价格维度时采用绝对价差和相对价差，在测算规模维度时采用成交量深度、金额深度、卖价深度和买价深度。更重要的是，我们的分析使用内幕交易数据，这进一步深化了信号假说。根据香港法律第396章《证券（披露权益）条例》以及《香港交易所上市规则》规定，上市公司高管必须从在香港交易所进行证券交易之日起五日内披露他们的交易活动。香港交易所将高管的交易活动信息发布在《每日证券（披露权益）摘要》以及董事或行政总裁披露权益通告上。采用内幕交易数据研究股票分拆是否有信号传递很有意义，因为这可以避免考虑业绩基准的问题。

本文发现股价表现与分拆公告显著正相关，这意味着实施股票分拆的公司利用股票分拆向市场传递了利好消息。微观结构数据分析显示股票分拆总体上改善了公

司流动性。分拆后的深度指标和交易量(价差指标)显著高于(低于)分拆前。分拆后公司流动性的提升有力支持了流动性假说。本文检验的内幕交易活动分析报告显示在公司股票分拆前存在异常买卖活动。考虑到公司经常在公告发布前数月做出股票分拆的决定,这一发现意味着内幕人选择提前利用私人信息获利。此外,本文还发现内幕交易和股票分拆的组合可以获得正的累积异常收益率。最后,文中的回归分析证明了流动性假说和最优交易区间假说。如同Amihud and Mendelson(1988)提出的,某种资产的流动性越大,其价值越大,公司因此可能采取增加流动性的措施来缓解流动性缺乏带来的成本和风险。这意味着公司利用股票分拆传递出要增加流动性并且将股价调整至最优交易区间的信号。总而言之,本文的实证结果说明股票分拆具有多重功能:改善流动性,重定交易价格以及信号传递。

本文的余下部分安排如下:第二部分为文献综述及理论假设,第三部分介绍研究数据和研究方法,第四部分和第五部分分别为实证结果与结论。

二、文献综述与理论假设

为了解释市场对于股票分拆扑朔迷离的反应,学者们提出大量假说,同时进行了大量的实证研究。其中最著名的几种假说为信号假说、最优交易区间假说、流动性假说以及税收选择假说。

信号假说认为,代价高昂的股票分拆向市场传递了有关公司现阶段业绩及未来发展前景的信息(Grinblatt, Masulis, and Titman, 1984)。股票分拆是代价高昂的信号,因为在分拆后,经纪人佣金中的固定比例部分会由于股价降低而上升(Brennan and Copeland, 1988; Brennan, and Hughes, 1991)。股票分拆公告日前后存在正的异常收益率的事实,支持了信号假说(例如Mukherji, Kim, and Walker, 1997; Ikenberry and Ramnath, 2002)。

关于流动性假说的讨论主要基于公司流动性受每股交易价格的影响(Maloney and Mulherin, 1992; Muscarella and Vetsuypens, 1996)。但是,有关流动性假说的证据是存在争议的。一部分研究认为公司流动性在股票分拆后降低而不是增加(Conroy, Harris, and Benet, 1990)。与之对应的另一部分研究则观察到交易量在分拆后有所增加,进而支持了流动性假说(Maloney and Mulherin, 1992; Desai, Nimalendran, and Venkataraman, 1998)。

最优交易区间假说认为,股票分拆作为一种将股价调整到期望的交易价格区间的工具,可以促使更多的小投资者购买股票。股票分拆被证实可以改善股票的销路,使分拆后的股票对财富有限的投资者而言更具吸引力(Baker and Gallagher, 1980; Lakonishok and Lev, 1987; McNichols and Dravid, 1990)。股票分拆可用于将股价调整至合理的价格区间,这样机构委托的最小绝对报价单位相对于股价而言是最优的(Angel, 1997)。

最优交易区间假说和流动性假说紧密联系,对股票分拆背后的逻辑进行解释。当公司股票在最优交易区间内交易时,公司流动性增加,因为投资者对每一只股票偏爱特定的价格区间(Easley, O'Hara, and Saar, 2001)。最优交易区间假说和流动性假说对股票分拆而言不是相互排斥的解释。Baker and Powell(1993)在对经理进行股

票分拆的动机的调查报告中指出，增加流动性的重要性被认为仅次于将股价推动到最优交易区间。

税收选择假说（Lamoureux and Poon, 1987）认为股票分拆会增加分拆公司的收益率波动，进而使投资者从税收时点选择中获益。[1] 不过税收选择假说与本文研究无关，因为香港不对资本利得和股利收入征税。[2]

本文关注了股票分拆影响的几个方面。按照信号假说，进行分拆的公司应显现正的异常收益率。如果如最优交易区间假说所言，股票分拆是公司将股价调整至可接受水平以吸引更多投资者的一种措施——特别针对财富有限的投资者，则本文预期市场对股票分拆公告应有正面反应。本文采用事件研究法衡量股票分拆公告日前后分拆公司异常的股价反应。进一步地，本文检验股票分拆发生前高管的内幕交易活动。如果股票分拆向市场传递了含有利好信息的信号，高管可能在消息公开披露前利用他们的私人信息优势在信息公开前交易。本文预期在股票分拆出现前观察到明显的内幕人购买、而不是卖出股票的行为。同时，基于流动性假说，本文也预期在分拆后的一段时间内观察到流动性模式的显著变化（更窄的价差和更大的深度）。[3]

三、研究数据和研究方法

3.1 研究数据

股票分拆的数据取自太平洋地区资本市场（PACAP）数据库的分配文件。PACAP分配文件记录有公告日期、除权除息日和股票分拆调整因子。股价收益率数据和会计数据则从PACAP数据库的公司收益率文件和财务报表文件中获取。PACAP包括两种公司的信息：金融公司和实业公司。本文只研究实业公司。

本文从由Primark维护的Inside Trade Asia数据库和由香港交易所维护的《每日证券（披露权益）摘要》以及董事或行政总裁披露权益通告中收集内幕交易信息。本文研究的内幕交易记录包括导致一名高管的持股比例发生变化的所有证券交易类型。

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1 美国税制下，长期资本利得可享有更优惠的政策。短期资本损失可用于抵扣短期资本利得。价格波动幅度大的有价证券提供给持有者实现短期资本损失或长期资本利得的机会，用以重建短期头寸。不过在香港的投资者不需要缴纳任何资本利得税。

2 近期越来越多的研究提出经理管理防御假说（Demsetz and Lehn, 1985; Morck, Shleifer and Vishny, 1988; McConnell and Servaes, 1990; Kole, 1995）。Lakonishok and Lev（1987）指出经理利用股票分拆扩大自己的持股，进而削减大型机构投资者的持股比例。在这种情况下，股东很难发起对管理层不利的行为。Mukherji, Kim, and Walker（1997）发现股票分拆后股东数量增加。由于股权数据难以获得，本文没有检验经理管理防御假说。

3 一些研究分析了股票分拆和股票股利的联合信号作用（如Grinblatt, Masulis and Titman, 1984; Banker, Das and Datar, 1993）。这两个事件时间颇为相似，因为它们都增加了分拆公司和支付股票股利的股数，与公司的分配政策相关，而且不改变现有股东的持股比例或该公司的现金流、资产及负债。但是，市场对于这两种事件的反应可能差异很大（Lakonishok and Lev, 1987; Rankine and Stice, 1997）。本文注重对股票分拆和内幕交易的研究，关于市场对股票股利和分拆公告的不同反应在另一篇论文中进行研究。

本文围绕股票分拆公告展开的对内幕交易活动的分析仅限于使高管的持股比例通过公开市场买卖增加或减少的内幕交易。我们的样本排除了其他类型的内幕交易，例如期权和权证交易、分红股、临时股息和奖金(Lin and Howe, 1990)。文中的买卖价差数据取自香港交易所研究和计划部的数据库。这个数据库提供在香港交易所交易的所有证券的当天交易信息，如买入价、卖出价、成交价、成交量和成交额，时间间隔为30秒。本文只研究普通股在股票分拆公告前后在流动性模式上的变化。

本文样本包括1980年至2000年21年中的162起"纯粹的"股票分拆事件。[4]在这162起分拆事件中，9起没有有效的公告数据，另外10起股票分拆公告是由金融公司发布的。本文采用控制样本配对法衡量发布分拆公告公司的异常股价变动。基于事件研究的控制样本配对法建立的筛选标准，本文从样本中又剔除了另外11起事件。最终用于事件研究分析的样本包括132起股票分拆。[5]表1为样本的统计总结。鉴于内幕交易和微观结构数据的有效性，本文对在股票分拆公告日前后发生的内幕交易活动和流动性模式的分析分别包含1993年至2000年的样本以及1996年至2000年的样本。

表1 股票分拆样本的统计总结

公共事业、房地产、综合企业、工业、酒店和其它行业是PACAP数据库对实业公司的不同分类。样本大小显示各行业类别中分拆公司的数量。分拆因子是一股旧股换成新股的数量。市场资本总额是分拆公司的市场价值。为了便于比较，本文在样本中列出了分拆公司的发行股数和股价以及行业中其它公司发行股数和股价的平均值。

	样本大小	均值(中位数) 分拆因子	市值 (千港元)	分拆公司 发行股数 (千股)	分拆公司 股价 (港元)	行业平均 发行股数 (千股)	行业平均 股价 (港元)
公用事业	4	4.0000(2.00)	36,289,748	469,536	64.50	1,729,870	8.17
房地产	39	7.7237(5.00)	2,841,399	287,901	17.98	539,418	3.52
综合企业	51	6.3431(5.00)	3,410,268	415,056	10.36	836,868	4.25
工业	32	5.4063(4.50)	5,601,363	345,784	17.99	634,059	2.25
酒店	4	17.2500(7.50)	2,666,621	208,869	31.28	290,102	3.68
其它	2	3.0000(3.00)	1,721,865	133,162	15.05	191,848	7.09
平均值		6.7328(5.00)	4,581,978	351,826	16.74	700,538	3.70
合计	132						

[4] 根据Grinblatt, Masulis and Titman(1984)，本文样本由纯粹的分拆组成，即我们选择未被公告日前后一段时间内(前一个月至后一个月)的其它公告污染的分拆公告作为样本。

[5] 为了表明我们的实证结果未受股票合并的影响，本文检查了股票合并事件，确认在检验期间样本内的公司没有发生股票合并事件。

分拆公司的平均分拆因子和平均市值分别为6.73和4,581,978,000港元。分拆公司发行的股票数量与对应行业的均值相比，后者是前者的两倍。尽管从股票发行量看，行业整体的平均值较高，但分拆公司的平均股票价格却是行业平均值的5.5倍。分拆公司在分拆前有比行业平均水平更高的平均股价的事实说明，分拆公司也许有动力利用股票分拆将股价调整至它们偏好的价格区间，并通过降低股价来提高股票的吸引力(Lakonishok and Lev, 1987)。

3.2 研究方法

3.2.1 异常股价反应

本文使用事件研究法衡量市场对股票拆分公告的异常反应。事件日期t = 0是PACAP数据库的分配文件中记录的公告日期。市场模型被用于估算第t天的异常股价反应，AR_{itm}定义为样本公司实现收益率和市场指数(香港恒生指数)实现收益率间的差值。

同时，本文采用控制样本配对法，选定一家没有进行股票分拆的配对公司作为计算异常收益率的基准(Barber and Lyon, 1997)，避免了衡量异常收益率时可能遇到的潜在问题。先前的研究曾使用了许多不同标准的配对公司(例如Fama and French, 1992)。比如，McNichols and Dravid (1990)使用行业和财政年度配对控制公司，而Byan and Rozef(2003)则使用公司规模和净值市价比。本文根据样本公司选择控制公司时考虑三种标准——公司规模、动量因子和行业类型。[6]

公司规模用净资产的市场价值表示。本文根据月度市场价值将公司分为五组(第1组到第5组)。本文用每个公司过去12个月的平均月度收益率计算动量因子。公司根据净资产的市场价值被分为两组——大公司组和小公司组。每组又按照各个公司过去12个月的平均月度收益分为三类(小，中，大)。因此根据动量因子本文可将公司分为六组。如果控制公司同某一样本公司处于同一个行业部门，且按照市值和动量因子测量可被归入同一个类别，本文就将这个控制公司与样品公司配对起来。

此外，由于本文衡量分拆公告日前后的内幕交易活动，控制公司不能在样本公司公告期间(从公告前十二个月至公告后十二个月)发布股票分拆公告或存在内幕交易。使用控制公司法，本文所估计的第t天的AR_{itc}，定义为样本公司i实现收益率与对应配对的控制公司j实现收益率的差值。

按照标准的事件研究流程(例如Brown and Warner, 1985)，用于检验异常收益率显著性的统计值是t =-300至t =-101这200天估计期间内的标准差。Brown and Warner (1985)证明了即使特定的日交易数据的特征被忽略，本文使用的标准流程也是很恰当的。本文的检验期为t =-60至t = +600。根据检验假说，股票分拆被认为传递了关于分拆公司价值的利好信息，使分拆公司的股票价格被调整至期望的价格区间，增加成交量，增加流动性，和改善股票销路。因此本文预期在股票分拆公告前后观察到积极的市场反应。

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[6] 感谢一位匿名审稿人建议本文在配比过程考虑动量因子。同时本文听从另一位审稿人的建议作为另一种方案，即根据公司规模和净价市值比选择控制公司。实证检验的结果基本不变。

3.2.2 异常内幕交易活动

诸多研究表明，内幕人掌握关于公司现在和未来业绩的私有信息(Seyhun, 1986; Lin and Howe, 1990)。在不同类型的公司事件前后都有观察到内幕交易活动的发生，例如盈余公布时(例如，Udpa, 1996)、增发(Gombola, Lee, and Liu, 1997)、兼并收购(Meulbroek, 1992)、公司破产申请(Seyhun and Bradley, 1997)、发行和退市(Lamba and Khan, 1999)，以及分析员变更预期盈利(Sivakumar and Vijayakumar, 2001)。这些研究说明内幕人有一个"规律的"交易模式——在好消息之前买入，在坏消息之前卖出。本文对异常内幕交易活动进行分析，以检验公司高管是否利用即将公布的股票分拆公告在市场上为他们自己的利益进行交易。因此，本文试图确定在分拆公告前的内幕交易活动(在六个月时间内)是否与其他时间段内的内幕交易活动存在异常。根据Gombola, Lee and Liu(1997)的研究，本文使用前期比较法(prior-period comparison method)估计公告前的异常内幕交易活动。用于比较的估计期间为股票拆分公告当月(m = 0)之前的六个月，即m =-12至m =-7。

估计期(-12 ≤ m ≤-7)的平均交易指标(交易股票数量与已发行的股票数量或者市场价值的比值)是预期交易水平。异常内幕交易活动用估计期(-6 ≤ m ≤ +6)的实际交易水平和该区间计算得出的预期交易水平之差计算。本文同样计算了估计期间(-12 ≤ m ≤-7)的标准差，并用它来检验估计期间(-6 ≤ m ≤ +6)异常交易活动的显著性(Brown and Warner, 1985)。

3.2.3 流动性模式(价差和深度)

市场对股票分拆有正面反应的解释之一是，此类公告引发分拆公司的股票流动性会增加的预期(Maloney and Mulherin, 1992; Muscarella and Vetsuypens, 1996)。为检验股票分拆造成的公司流动性的变化，本文比较了分拆前和分拆后的流动性模式(价差和深度)。本文预期在分拆后观察到更窄的价差和更深的深度。

本文检验了价差和深度——流动性模式的两个维度在分拆公告前后的变化。价差衡量价格方面的流动性，而深度衡量规模方面的流动性。价差量化了交易成本。较宽的价差意味着较高的交易成本和较低的流动性。深度显示交易中成交量和成交金额的作用。更深的深度反映出更大的交易量和交易金额，进而产生更高的流动性。这两个维度表现为负相关(Lee, Mucklow and Ready, 1993; Brockman and Chung, 1999)，即宽(窄)价差与浅(深)深度联系在一起。本文使用两种价差度量和四种深度度量来分析流动性的变化。

本文的两种价差度量是绝对价差和相对价差，因为绝对价差和相对价差作为两种度量各有优势。虽然相对价差能更好衡量被交易的每一元的交易费用，但它对股票价格上变化的敏感性要高于它对交易环境的敏感性(Miller and McConnell, 1995)。绝对价差是第t天买卖价绝对金额差的均值(时间间隔30秒)。相对价差是第t天买卖价绝对金额差除以买卖价平均值的均值(时间间隔30秒)。深度由成交量深度、成交金额深度、买价深度、卖价深度衡量。这些深度度量代表了流动性规模的不同方面(成交量、成交金额、购买笔数和出售笔数)。成交量深度是在记录在册的最高买入价买入的股票数与最低卖出价卖出的股份数(经过发行股数的调整)之和除

以发行股票数。金额深度是第t天在记录在册的最高买入价买入的股票数乘以最高买入价与最低卖出价卖出的股票数乘以最低卖出价之和(经过价格和发行股数之积的调整)除以股票市值，时间间隔为30秒。卖价(买价)深度是最低卖价(最高买价)(经过发行股数的调整)和最低卖价(最高买价)的股数与价格的乘积，时间间隔为30秒。

3.2.4 回归分析

为解释公告前后出现的正的异常收益率，学者们提出诸多假设，并进行了大量的实证研究。本文采用了一种与早先研究类似的方法——建立一个横截面模型来解释分拆公司的累计异常收益率(*CAR*)。模型被定义如下：

$$\begin{aligned} CAR_{it} = \quad & a_0 + \beta_1 VolRatio_{it} + \beta_2 FACTOR_{it} + \beta_3 PriceDev_{it} + \beta_4 ShareDev_{it} + \\ & \beta_5 EPSChg_{it} + \beta_6 Multiple_{it} + \beta_7 MktValue_{it} + \beta_8 HSD_{it} + \beta_9 B/M_{it} + \\ & \beta_{10} RetVar_{it} + \varepsilon_i \end{aligned} \quad (1)$$

成交量被普遍用于表示流动性(Datar, Naik, and Radcliffe, 1998; Amihud, 2002)。回归模型中包含*VolRatio*以检验流动性假说。*VolRatio*表示为发行股数正态化[7]后的分拆前成交量与分拆后成交量的比值。

最优交易价格假说断定存在有利于增加股票销路的股价区间。分拆因子的大小向市场传递了有关于期望均衡交易价格区间和有关公司未来盈利信息的私人信息程度(Brennan and Copeland, 1988; Brennan and Hughes, 1991)。分拆因子大，表明当前股票价格不在最优交易区间内。本文在回归模型中引入分拆因子的大小(*FACTOR*)以控制分拆规模的影响。*FACTOR*定义为分拆因子大小的自然对数。

Lakonishok and Lev(1987)认为分拆因子受分拆公司股价与市场(或者行业)平均价格之间的离差的影响。股票分拆被认为是用以将股价调整至公司认为合适的、偏好的交易价格区间——通常这个交易区间由相关行业和市场价格水平的中位数或平均值确定。本文采用*PriceDev*和*ShareDev*两个变量来检验最优股价假说。*PriceDev*是股票价格和行业价格中位数的离差的自然对数。*ShareDev*是发行股数和行业发行股数中位数的离差的自然对数。相对于中位数的离差越大，异常收益率应该越大。因此本文预期*PriceDev*和*ShareDev*与异常收益率正相关。

对应于股票分拆有传递公司股价被低估的信号作用的观点，Asquith, Healy, and Palepu(1989)提供证据证明了分拆公司较分拆前业绩好转，且分拆公告前后的股价收益率与分拆前的盈余增长率相关。因此本文引入变量*EPSChg*，定义为当年每股收益相比于前三年每股平均收益的百分比变化。

Pilotte and Manuel(1996)发现，如果当前的股票在分拆前已有过分拆，市场对此会有更好的反应。根据有效市场假说，针对后一个股票拆分公告的股价反应应该较不显著，因为没有信号动机。相对地，最优交易价格假说坚持认为重复分拆暗示

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[7] 分拆公告前的发行股数与公告后的不同。为了更好地比较公告前后交易活动的变化，本文根据已发行股股对成交量进行标准化处理。

着利用分拆阶段性降低股价的分拆公司有卓越的业绩表现。Huang, Liano, Manakyan and Pan（2008）最近认为频繁分拆更符合交易价格区间假说和改善流动性假说，而不频繁的分拆更符合信号假说。为了确定这些观点的价值以及由重复分拆导致的异常收益率的不同，本文引入变量*Multiple*来检验分拆频率的作用。*Multiple*是一个虚拟变量，如果在样本时期发生多于一次的分拆公告，其值取1。

一般而言，小公司相比于大公司而言提供的市场信息较少。如果股票分拆起信号作用，小公司股票分拆公告传递信号的信息含量应该高于由大公司股票分拆公告传递信号的信息含量。因此，小公司公告期前后的异常收益率应高于大公司（Ikenberry, Rankine and Stice, 1996）。本文采用公司规模（*MktValue*）表示这种信息的不对称，并预测异常收益率和*MktValue*之间呈负相关关系。[8] *MktValue*由分拆公司分拆公告前一月的市场价值的自然对数计算得出。

*HSD*为虚拟变量。当恒生指数日收益率的年平均值为正时取值为1，否则取值为0。*BkMkt*表示的是净资产的账面价值与市场价值的比值。本文的回归模型引入*HSD*和*BkMkt*作为控制变量，因为这些变量可能与流动性指标相互作用。最后，许多研究文章在模型中加入了股票分拆后收益的波动性（Lamoureux and Poon, 1987; Dubofsky, 1991; Koski, 1998; Gray, Smith and Whaley, 2003），故本文也在回归模型中加入了收益率的标准差（*RetVar*）。

四、实证结果

4.1 异常股价反应

信号假说认为公司拆股的动机之一是公司对其股价未来上涨持乐观态度。因此，股票分拆公告应导致积极的股价表现。表2报告了市场对分拆公司不同时段内的反应，从t =-60 至t = +600。图1描述了基于市场模型的累计异常收益率走势。公告前60天至公告后600天的异常收益率大部分为正。本文发现公告期间三天内（$-1 \le t \le +1$）的异常收益率在1%的水平下显著为正。用市场模型计算这三天的累计异常收益率为5.08%，用控制公司配对法计算为4.91%。正的异常收益率表明股票分拆向市场传递了利好消息。对比公告期前后与公告前一段时间（$-60 \le t \le -1$）的收益率发现，异常收益率高达35%-42%。分拆前的高异常收益率可能由分拆公告在即的内幕信息泄露导致。不过，最优交易区间假说认为，分拆前的高股价可能是促使公司决定股票分拆和将股价降至最优交易区间的动因。[9]为检验这一假说，本文在回归分析中著重检验了公告后的收益率。

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[8] 本文使用跟踪公司的金融分析师数量作为另一个信息不对称的度量。不过由于IBES分析师近年来针对大公司的预测越来越容易获得，相关数据的可利用性受到限制。此外，用金融分析师的数量作为信息不对称的度量缺乏可操作性。除了使用市值代表公司规模，本文还用总资产衡量规模并重新运行了模型。结果在数量上相似。

[9] 作者感谢匿名审稿人提出这个建议。

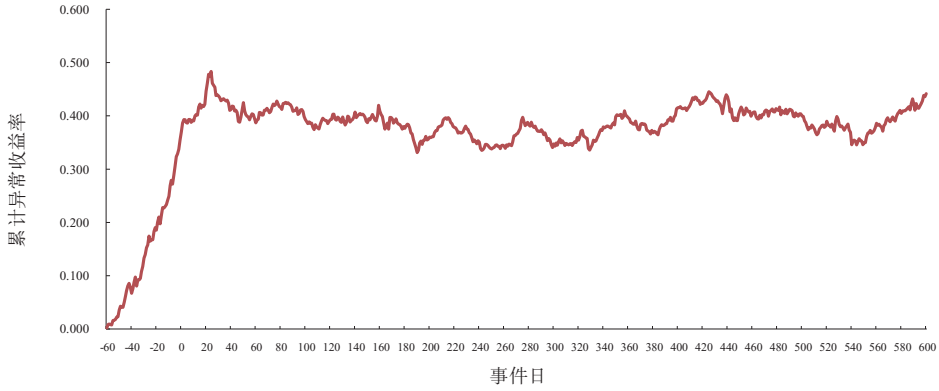
表2 股票分拆公告前后的异常收益率

基于市场模型，第t天的异常收益率AR_{itm}定义为样本公司i的实现收益率与市场指数实现收益率（文中是香港恒生指数的实现收益率）的差值。在控制样本配对法下，第t天的异常收益率AR_{itc}通过样本公司i的实现收益率与相配对的控制公司j的实现收益率的差值计算。本文选用三种标准（公司规模、动量因子和行业类型）为样本选择配对的控制公司。时间窗口为t =-60至t = +600。

事件窗口	异常收益率（市场模型法）（t统计量）	异常收益率（控制公司配对法）（t统计量）
-60, -1	0.4218	0.3549
	(13.02)**	(7.01)**
-30, -1	0.2463	0.2377
	(10.76)**	(6.64)**
-10, -1	0.1018	0.1131
	(7.70)**	(5.47)**
-1, +1	0.0508	0.0491
	(7.02)**	(4.34)**
0	0.0168	0.0146
	(4.03)**	(2.24)*
-3, +3	0.0892	0.0694
	(8.07)**	(4.01)**
-5, +5	0.1040	0.0985
	(7.50)**	(4.55)**
-10, +10	0.1349	0.1486
	(7.04)**	(4.96)**
-1, +30	0.1255	0.1004
	(5.31)**	(2.72)**
-1, +60	0.0903	0.0497
	(2.74)**	(0.97)
-1, +100	0.0652	0.0559
	(1.54)	(0.85)
-1, +200	0.0313	0.0229
	(0.53)	(0.25)
-1, +400	0.0383	0.0782
	(0.46)	(0.60)
-1, +600	0.2109	0.1045
	(2.06)*	(0.65)

** 和* 分别表示在1%和5%水平上统计显著（双边检验）。

图1 累计异常收益率走势



Asquith, Healy, and Palepu (1989) 认为股票分拆公告传递的信息可在分拆后持续数年。Ikenberry, Rankine, and Stice (1996) 以及 Desai and Jain (1997) 提供更多证据证明股票分拆导致长期异常收益率。本文中的市场模型结果显示 $-1 \le t \le +200$，$-1 \le t \le +400$ 和 $-1 \le t \le +600$ 期间的长期异常收益率均为正（尽管只有在 $-1 \le t \le +600$ 的期间是显著为正的）。如图1所示的公告前第60天至公告后第600天的累计异常收益率，在至第600天时仍保持着约40%的高水平。结果证明，就长期而言，股票分拆在分拆前到分拆后的期间都对分拆公司的股价表现有影响。

4.2 异常内幕交易活动

本文在这一部分使用异常内幕交易活动数据确定分拆信号的信息含量。直观地讲，在不考虑法律问题的前提下，如果内幕人知道公司即将进行股票分拆的消息，并且预期市场会对此做出积极反应的话，他们应该在公告发布前买入分拆公司的股票。因此，本文预期在分拆公司的内部人中可观察到明显的买入活动。表3.A显示了采用股票市值作为内幕交易指标时本文对异常内幕交易活动的分析结果。[10] 我们采用三个变量“买入”、“卖出”和“净值（买入和卖出的差）”来确定不同交易方向上的交易活动强度。[11] 此外，本文根据 $m = 0$ 至 $m = +2$ 这三个月中的内幕交易采用的策略将样本分为“净买”、“净卖”和“无内幕交易”三类，估计它们的相对异常收益率。净买（卖）意味着被买入股票的市值高于（低于）被卖出股票的市值。“无内幕交易”意味着不存在内幕交易活动。表3.B为相应结果。图2展示了累计异常收益率的走势。

在分拆前 $-6 \le m \le -1$ 的时间里，本文发现 $m = -6$ 到 $m = -3$ 之间存在明显的买卖活动。不过，比较 $-6 \le m \le -3$ 和 $-2 \le m \le -1$ 两阶段后发现，$-2 \le m \le -1$ 区间内的内幕交易微不足道。在分拆公告前两个月中交易活动微不足道，可能是受到基于私人和价格敏感信息交易的调查的威胁。因此内幕人会选择提前（决定拆股通常在公

[10] 本文按照匿名评审的建议，使用交易股数占发行股数和交易股数的比例作为内幕交易指标。其结果与使用市场价值计算得出的结果实质上相同。
[11] “净值”为正值意味着买入量多于卖出量。

告之前的数月）利用私人信息获得利益。事实上本文发现内幕人在m =-4有显著的净买入，而紧接著在m =-3有显著的净卖出。公告前期内幕人大量的净买入可能是因为分拆前有高额异常收益率（见图1）。高额收益会诱使内幕人卖出手中的股份，实现资本利得。

至于累积异常内幕交易活动（$-6 \le m \le -1$），买入和卖出的异常市场价值分别是54.99（在1%水平下统计显著）和18.52（在5%水平下统计显著）。异常市场价值说明在分拆公告前，由高管在6个月的检验区间（$-6 \le m \le -1$）中买入（卖出）的股票比在此前六个月的检验区间（$-12 \le m \le -7$）买入（卖出）的股票在市值上高出5,499万港元（1,852万港元）。净累积异常市场价值为14.96，在5%的水平下显著。尽管在分拆前也有明显的卖出活动，本文发现在$-6 \le m \le -1$这一区间存在正的净累积异常市场价值，这为股票分拆向市场传递利好信号且内部人基于这种利好信号的预期进行交易的观点提供依据。

当我们把样本划分为如表3.B所示的“净买”、“净卖”和“无内幕交易”三个子样本时，本文发现“净买”子样本存在显著为正的异常收益率，而“净卖”和“无内幕交易”两个子样本的异常收益率为负但不显著。这意味着内幕购买和股票分拆的组合向市场传达了分拆公司未来前景的利好信息（Grinblatt, Masulis, and Titman, 1984）。

表3 股票分拆公告日前后基于市场价值计算的异常内幕交易活动

“买入”子样本由买入股票的事件组成。“卖出”子样本由出售股票的事件组成。净值子样本由股票净买入（买入股票的市场价值超出卖出股票的市场价值）的事件构成。“净值”为正（负）意味着买入股票的市场价值高于（低于）卖出股票的市场价值。买入（卖出）的市场价值为0.1227 （-8.3660）说明在分拆前第6个月高管买入（卖出）的股票价值比分拆公告前六个月的估计期（$-12 \le m \le -7$）买入（卖出）的股票价值的月平均值高12.27万港元（低836.60万港元）。买入（卖出）的异常市场价值为54.990（18.521）说明在六个月的估计期内（$-6 \le m \le -1$），高管买入（卖出）的股票价值比分拆公告前六个月的估计期（$-12 \le m \le -7$）买入（卖出）的股票价值的高5,499万港元（低1,852.1万港元）。净累积异常市场价值是买入和卖出的差值，表中为1,495.6万港元，在5%的水平上统计显著。“净买（卖）”净买（卖）意味着被买入股票的市值高于（低于）被卖出股票的市值。本文选用三种标准（公司规模、动量因子和行业类型）为样本选择配对的控制公司。

Panel A：异常内幕交易活动分析

	买入	卖出	净值
		异常内幕交易活动	
事件月份		（t统计量）	
-6	0.1227	-8.3660	6.4069
	(0.07)	(-2.26)*	(2.46)*
-5	-1.4532	1.9969	-2.5852
	(-0.77)	(0.54)	(-0.99)

事件月份	买入	卖出	净值
		异常内幕交易活动（t统计量）	
-4	43.5668	-3.4587	25.2576
	(23.19)**	(-0.94)	(9.71)**
-3	17.9388	30.4667	-12.6121
	(9.55)**	(8.24)**	(-4.85)**
-2	-1.8424	-1.3124	-0.0507
	(-0.98)	(-0.36)	(-0.02)
-1	-3.3431	-0.8058	-1.4603
	(-1.78)	(-0.22)	(-0.56)
0	3.0762	8.3423	-4.4231
	(1.64)	(2.26)*	(-1.70)
+1	2.3441	-0.4135	1.8006
	(1.25)	(-0.11)	(0.69)
+2	2.4120	5.1755	-1.7471
	(1.28)	(1.40)	(-0.67)
+3	20.2183	21.6708	-0.3480
	(10.76)**	(5.86)**	(-0.13)
+4	10.9653	3.7529	4.8274
	(5.84)**	(1.02)	(1.86)
+5	2.1259	25.0936	-15.6405
	(1.13)	(6.79)**	(-6.02)**
+6	-1.1683	-3.2408	1.2183
	(-0.62)	(-0.88)	(0.47)
-6 to -1	54.9898	18.5207	14.9561
	(11.95)**	(2.05)*	(2.35)*

** 和* 分别表示在1%和5%水平上统计显著（双边检验）。

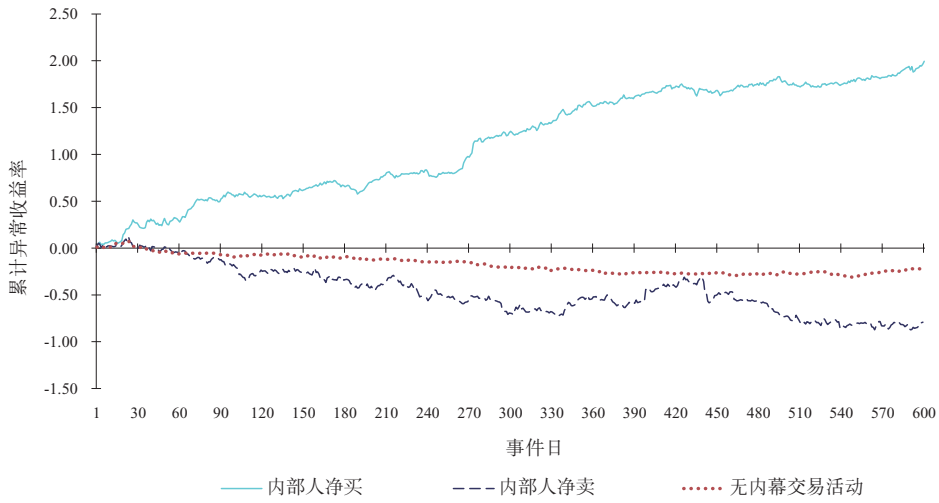
Panel B：异常收益率

事件窗口	累计异常收益率（t统计量）			
	全样本	内部人净买	内部人净卖	无内幕交易活动
+1, +30	0.0681	0.2693	0.0125	0.0113
	(1.90)	(3.04)**	(0.11)	(0.29)
+1, +60	0.0175	0.2963	-0.0458	-0.0643
	(0.34)	(2.37)*	(-0.28)	(-1.16)
+1, +100	0.0236	0.5669	-0.1768	-0.0974
	(0.36)	(3.51)**	(-0.84)	(-1.36)

事件窗口	累计异常收益率（t统计量）			
	全样本	内部人净买	内部人净卖	无内幕交易活动
+1, +120	0.0233	0.5491	-0.2341	-0.0746
	(0.33)	(3.10)**	(-1.02)	(-0.95)
+1, +150	0.0179	0.6147	-0.2621	-0.0971
	(0.22)	(3.10)**	(-1.02)	(-1.11)
+1, +200	-0.0094	0.7022	-0.4070	-0.1258
	(-0.10)	(3.07)**	(-1.37)	(-1.25)
+1, +400	0.0460	1.6600	-0.4457	-0.2603
	(0.35)	(5.14)**	(-1.06)	(-1.82)
+1, +600	0.0722	1.9663	-0.7922	-0.2243
	(0.45)	(4.97)**	(-1.54)	(-1.28)

** 和* 分别表示在1%和5%水平上统计显著（双边检验）。

图2 累计异常收益率走势



4.3 流动性模式（价差和深度）

为了检验流动性假说，本文比较了公司流动性分拆公告前后在价格和规模维度上的变化。为了避免任何因分拆公告引起的、在分拆前后出现的短暂交易增加的潜在影响，本文从流动性检验中剔除了从公告前第20天至公告后第20天的样本。[12]分

[12] 从样本中剔除分拆公告的一定时期的检验结果与剔除分拆公告和前一次公告日期间的一段时期的结果相同。Conroy, Harris, and Benet (1990)、Ferris, Hwang, and Sarin (1995)以及Desai, Nimalendran, and Venkataraman (1998)在检验股票分拆的微观结构时也从他们的样本中剔除了分拆公告日和前一次公告日间的这段时间，以避免公告日前后的数据污染，前一次公告日前后短暂的微观结构效应以及因之前发行和当前发行股票双重交易导致的扭曲。

拆前和分拆后重新定义为分拆公告前第20天之前的20个交易日和公告后第20天开始的20个交易日。本文进行了针对样本差异的双样本t检验和非参数的Mann-Whitney检验。表4为检验结果，证明分拆后价差变窄和深度变深，因而证明流动性被改善。[13]

本文发现两种价差指标——绝对价差（0.088和0.024）和相对价差（0.023和0.021）——相比于分拆前在分拆后有所降低。其中，绝对价差的下降在参数和非参数检验中都显著（1%水平下）。尽管相对价差的下降不像绝对价差那么明显，分拆前和分拆后价差水平的平均差在参数检验中也显著（1%水平下）。分拆后价差变窄说明随股票分拆，流动性增加。

至于四个深度指标——成交量深度（0.187和0.296），成交金额深度（0.231和0.451），买价深度（0.109和0.250）以及卖价深度（0.123和0.201）——从分拆前期到分拆后期深度水平的增加暗示公司流动性改善。特别是成交量深度、成交金额深度和买价深度分拆后深度增加在统计上显著。

为衡量股票分拆增加还是减少了交易活动，本文比较了分拆前后期的交易量和市场价值。Maloney and Mulherin（1992）、Desai, Nimalendran, and Venkataraman（1998）记录了分拆后交易量增加，并因此得出该现象可佐证流动性增加的结论。从表4中可以看出，股票的交易数量（0.011和0.032）和市场价值（0.011和0.032）的平均值确实增加了。这意味着通过把股价降低到更低的交易价格区间，分拆股票增加了销路，进而交易活动增加。

分拆前的平均股价与分拆后的平均股价存在显著差异，这说明分拆公司利用股票分拆把他们的股价降低到一个偏好的水平。分拆前股价是分拆后股价的三倍（6.530和2.182）。虽然分拆后股价显著下跌，收益的波动性因分拆显著增加（0.007和0.011），这与在美国市场的发现一致（如Gray, Smith, and Whaley, 2003）。尽管较低的股价可以增加股票的吸引力，收益率波动的增加反而对股票的销路有消极影响。对于我们发现的分拆后期的收益率波动增加有两种解释。Ohlson and Penman（1985）以及Dravid（1987）主张分拆后期的收益率波动性增加是由于分拆后价差变大的结果。Karpoff（1987）则解释为收益率波动性增加可能是因为分拆后波动性和成交量之间存在正相关关系。Jones, Kaul, and Lipson（1994）进一步认为，交易活动增加向市场传递了信息，因此影响了股价和收益率波动性。由于本文仅观察到在分拆后成交量变大，而没有观察到价差变大，本文得出收益率波动增加的结果应该主要由交易活动增加所致。

本文的样本比较数据显示在分拆公告后价差变窄，深度变深，成交量变大。这些发现符合流动性假说，为说明股票分拆改善股票流动性提供了依据。

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[12] 从样本中剔除分拆公告的一定时期的检验结果与剔除分拆公告和前一次公告日期间的一段时期的结果相同。Conroy, Harris, and Benet（1990）、Ferris, Hwang, and Sarin（1995）以及Desai, Nimalendran, and Venkataraman（1998）在检验股票分拆的微观结构时也从他们的样本中剔除了分拆公告日和前一次公告日间的这段时间，以避免公告日前后的数据污染，前一次公告日前后短暂的微观结构效应以及因之前发行和当前发行股票双重交易导致的扭曲。

[13] 除了使用剔除了从公告前第20天至公告后第20天的样本进行检验外，为了证明本文结果的稳健性，本文用不同的检验窗口重复了对照分析。检验窗口包括±10天、±15天、±20天、±25天、±35天以及±40天。结果证实，分拆后价差变窄和深度变深的结论不受检验窗口的长度的影响。

表4 分拆日期前后流动性模式的比较

分拆前和分拆后时期被分别定义为扣除特定时段的之前20个交易日和之后20个交易日(比如从公告日期前的20天到公告日期后的20天)。*PRICE*是时间间隔为30秒的日交易价格的平均值。*RETURN*用同期平均买卖价差与相对滞后平均值的比值的自然对数估计，时间间隔为30秒。*VOLATILITY*是日连续收益率的标准差。*VOLUME*是经发行股数调整过的每日成交量总额。市场价值是经公司市场价值调整过的每日被交易股票的市值。绝对价差是第*t*天绝对买卖价差的港元值(时间间隔为30秒)的日均值。相对价差是绝对买卖价差的港元值除以买卖价平均值(时间间隔为30秒)的日均值。成交量深度是第*t*天在记录在册的最高买入价买入的股票数与最低卖出价卖出的股票数(经过发行股数的调整，时间间隔为30秒)之和除以发行股票数。成交金额深度是第*t*天在记录在册的最高买入价买入的股票数乘以最高买入价与最低卖出价卖出的股票数乘以最低卖出价之和(经过价格和发行股数之积的调整)除以股票市值，时间间隔为30秒。卖价(买价)深度是第t天最低卖价(最高买价)(经过发行股数的调整)和最低卖价(最高买价)的股份数与价格乘积，时间间隔为30秒。

	分拆期前	分拆期后	均值差异的t值
PRICE	6.530	2.182	17.152**[b]
RETURN	0.000	-0.001	2.294*[b]
VOLATILITY	0.007	0.011	-2.799**[b]
VOLUME	0.011	0.032	-5.260**[b]
市场价值	0.011	0.032	-5.254**[b]
绝对价差	0.088	0.024	25.589**[b]
相对价差	0.023	0.021	2.423*
成交量深度	0.187	0.296	-2.400*[b]
成交金额深度	0.231	0.451	-3.446**[a]
卖价深度	0.109	0.250	-4.793**[b]
卖价深度	0.123	0.201	-1.534[b]

[a] 使用Mann-Whitney检测得出的分拆期前与分拆期后结果的均值差异在5%的水平上统计显著。

[b] 使用Mann-Whitney检测得出的分拆期前与分拆期后结果的均值差异在1%的水平上统计显著。

** 和* 分别表示在1%和5%水平上统计显著(双边检验)。

4.4 回归分析

表5为回归模型(1)的结果。[14]变量的描述性统计和回归结果分别列于表5.A和表5.B中。[15]系数的*t*值使用White方法(1980)进行了异方差调整。

[14] 我们获得了1993年至2000年的内幕交易活动数据，而日交易数据则从1996年至2000年。考虑到在回归模型中同时包含这两个变量会大大减少可用样本的数量，本文采用成交量(*VolRatio*)作为流动性的度量，而使用每股收益变化(*EPSChg*)作为信号的度量。

[15] 为表明本文的回归模型不存在多重共线性问题，我们计算了独立变量的VIF(方差膨胀因子)。VIF的值小于2，说明本文模型中不存在多重共线性问题。

如果股票分拆以努力降低股价、增加交易活动的流动性为动机，则本文预期异常收益率和*VolRatio*符号相反。表5中*VolRatio*的系数为负，意味着观察到的正的异常收益率可能是分拆后流动性增加所致。

最优交易区间假说断定，存在可增加股票销路的最优股价区间。本文发现*PriceDev*显著为正，符合该假说。但是*ShareDev*不显著，这说明市场对于股价高于行业价格中位数的公司的股票分拆有更积极的反应。最优交易区间假说认为股票分拆的一大动机是将股价调整到一个与同行业其它公司股价一致的水平或者到一个最优的交易价格区间，本文的发现为此提供了依据。较大的分拆因子导致分拆后股价较大幅度的下跌，进而使单笔交易的要求降低。不过表5显示分拆因子的大小*FACTOR*并不显著。根据Peterson and Peterson（1992），本文也采用另一种方法估计目标股价，重新运行回归模型。我们得到相似的结果，说明本文的发现对不同的目标交易价格的衡量指标稳健，可有力支持最优交易区间假说。

先前的一些研究证明，分拆公司在分拆前一般有较好的盈余表现，且分拆公告带来的收益率与此前的盈余增长相关。不过，对比Asquith, Healy, and Palepu（1989）在美国市场中的发现，表5中的*EPSChg*不显著，这表明在香港市场中分拆收益与分拆前的盈余表现不相关。[16]

我们发现，一些公司（占9.87%）在本文的样本期间中进行不止一次分拆。为了确定由重复分拆引发的异常收益率的不同，本文引入变量*Multiple*用于检验分拆频率的作用。从表5可以看出所有*Multiple*的系数都不显著，这表明重复分拆未对市场发送额外信号。这一结果与Huang, Liano, Manakyan, and Pan（2008）的论断相一致。该文章认为，频繁的分拆更符合交易价格区间——流动性改善假说。

本文发现*MktValue*的系数为负，但不显著。*MktValue*在本文的回归模型中不显著的原因之一可能是因为本文衡量异常收益率时在选择配对公司时控制了公司规模。另外两个变量*HSD*和*BkMkt*也不显著。

最后，本文发现收益率波动率（*RetVar*）和分拆后$-1 \le t \le +30$时段内的异常收益率呈正相关关系。如上文所述，因为我们在表4所示分拆后的结果中观察到了变窄（增加）而不是变宽（减少）的分拆后价差（交易活动），本文将收益率波动和分拆后异常收益率显著正相关归因于分拆公司流动性的增加。

本文进行了一系列的敏感性测试以表明文中的回归结果对于其它度量方法和估计方法是稳健的。同表4所示的流动性模式分析类似，我们采用不同时间段来估计*VolRatio*，以说明表5所示的回归结果对用来衡量流动性变量的时间段不敏感。如表5所示，*VolRatio*由分拆前期和分拆后期60天的平均成交量计算得出。我们选取不同的时间段，±10天、±15天、±20天、±25天、±30天、±35天、±40天、±45天、±50天和±55天重复分析后得到相似的结果，这与用来估计*VolRatio*的时间段长度无关。

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[16] 如表5所示，*ESPChg*是利用净利润计算得出的。为证明其稳健性，我们也采用另一个变量——营业收入——重复了回归分析。结果类似。

表5 回归分析

$$CAR_{it} = a_0 + \beta_1 VolRatio_{it} + \beta_2 FACTOR_{it} + \beta_3 PriceDev_{it} + \beta_4 ShareDev_{it} + \beta_5 EPSChg_{it} + \beta_6 Multiple_{it} + \beta_7 MktValue_{it} + \beta_8 HSD_{it} + \beta_9 B/M_{it} + \beta_{10} RetVar_{it} + \varepsilon_i \quad (1)$$

*CAR*是不同检验期内的累计异常收益率(-1 ≤ *t* ≤ +30，-1 ≤ *t* ≤ +60，-1 ≤ *t* ≤ +100以及-1 ≤ *t* ≤ +200)。第*t*天的异常收益率AR_{itc}利用控制公司样本配对法通过样本公司*i*的实现收益率与相配对的控制公司*j*的实现收益率的差值估计。本文选用三种标准(公司规模、动量因子和行业类型)为样本选择配对的控制公司。*VolRatio*是发行股数正态化后的分拆前成交量与分拆后成交量的比值。*FACTOR*是分拆因子大小的自然对数。*PriceDev*是股票价格和行业价格中位数的离差的自然对数。*ShareDev*是发行股数和行业发行股数中位数的离差的自然对数。*EPSChg*为当年每股收益相比于前三年每股平均收益的百分比变化。*Multiple*是一个虚拟变量，如果在样本区间1980年到2000年间发生多于一次的分拆公告，其值取1。*MktValue*由分拆公司分拆公告前一月的市场价值(发行的股票数量与价格的乘积)的自然对数计算得出。*HSD*为虚拟变量。当恒生指数日收益率的年平均值为正时取值为1，否则取值为0。*BkMkt*是净资产的账面价值与市场价值的比值。*RetVar*是收益率的标准差。系数的*t*值使用White方法(1980)进行异方差调整。

Panel A：描述性统计

	均值	中位数	最大值	最小值	标准差
VolRatio	2.3884	1.2747	16.9779	0.0005	3.1782
FACTOR	1.4276	1.3863	3.9120	0.0000	0.6670
PriceDev	1.5493	1.5597	5.4951	-1.9901	1.5960
ShareDev	12.1983	12.4350	15.7564	8.8232	1.1401
EPSChg	0.0329	0.1106	1.6301	-1.4541	0.7820
MktValue	13.9602	13.6175	18.2747	10.0237	1.6688
HSD	0.4615	0.0000	1.0000	0.0000	0.5013
BkMkt	0.7647	0.5411	5.2321	0.0063	0.9062
RetVar	0.0448	0.0386	0.1027	0.0151	0.0203

Panel B：回归结果

	估计系数(t统计量)			
	-1 ≤ *t* ≤ +30	-1 ≤ *t* ≤ +60	-1 ≤ *t* ≤ +100	-1 ≤ *t* ≤ +200
Intercept	0.3949 (1.06)	0.0988 (0.24)	0.1329 (0.26)	0.3401 (0.44)
VolRatio	-0.0239 (-2.38)*	-0.0333 (-3.95)**	-0.0265 (-1.96)*	-0.0492 (-3.09)**
FACTOR	-0.0109 (-0.29)	-0.0685 (-1.16)	-0.1009 (-1.33)	-0.1251 (-1.24)
PriceDev	0.0355 (2.42)*	0.0757 (2.81)**	0.0785 (2.26)*	0.0588 (1.08)
ShareDev	-0.0360 (-1.13)	0.0016 (0.05)	-0.0245 (-0.68)	-0.0392 (-0.78)
EPSChg	-0.0466 (-1.49)	-0.0652 (-1.39)	-0.0965 (-1.89)	-0.0731 (-0.82)
Multiple	-0.0290 (-0.41)	-0.1618 (-1.86)	-0.1127 (-1.10)	0.1523 (0.80)
MktValue	-0.0038 (-0.19)	-0.0106 (-0.47)	0.0093 (0.30)	0.0134 (0.29)
HSD	0.0503 (1.14)	0.0333 (0.38)	0.0835 (0.80)	0.1272 (0.84)
BkMkt	-0.0304 (-1.02)	-0.0153 (-0.56)	-0.0060 (-0.17)	-0.0624 (-0.91)

	估计系数(t统计量)			
	$-1 \leq t \leq +30$	$-1 \leq t \leq +60$	$-1 \leq t \leq +100$	$-1 \leq t \leq +200$
RetVar	3.9134 (2.72)**	2.7544 (1.51)	2.6103 (0.90)	2.0407 (0.48)
Adj R^2	0.1959	0.1232	0.0622	0.0678
F-statistic	3.1433	2.2511	1.5904	1.6541
p-value	0.00	0.02	0.12	0.11

** 和* 分别表示在1%和5%水平上统计显著(双边检验)。

五、结论

本文利用日交易、内幕交易和当天高频买卖价差数据研究股票分拆和内部交易对于香港市场中股票价格的影响。本文首先详细研究了市场对于股票分拆公告的异常反应。本文发现分拆公司在公告日前后存在显著的异常收益率，这与针对不同资本市场的其它诸多研究的发现一致。这种积极反应可能可归因于流动性改善和公司试图将其股价调整至最优交易区间的利好信号。

因为当观察到市场对股票分拆公告的积极反应时很难从中区分不同的信号效应，本文采用异常内幕交易活动确定分拆信号中的信息含量。本文发现，尽管在分拆公告前的两个月内内幕交易活动微不足道，分拆公告前三到四个月以及分拆后存在异常多的内幕交易活动。因为公司经常在公告前数月已做出分拆决定，这一发现说明公司内部人选择提前从他们的私人信息中获利。内部人在公告后进行交易更合适，因为这样可以避免违法交易的指控——这也可以解释公告期前后异常交易活动的发现。此外，本文还发现内幕购买和股票分拆组合在一起可以获得显著为正的累计异常收益率。

本文的微观结构数据分析表明，股票分拆可改善流动性。本文发现价差在分拆后相比于分拆前明显变窄，且股票分拆使交易深度得到显著改善。回归分析也支持股票分拆后成交量增加的发现。这意味着由流动性增加支持的分拆公告可能扮演的信号传递角色。

总体而言，我们的结果表明上市公司利用股票分拆作为旨在增加流动性、且将公司股价调整至最优交易区间的一种信号机制。

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Stock Splits and Insider Trading

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Abstract

We use daily trading, insider trading, and high-frequency intraday bid-ask data to investigate the effect of stock splits and insider trading on share prices in Hong Kong. We find positive price reactions to stock splits and conclude that these may be attributable to the favourable signals that stock splits send and the improved liquidity they provide. Second, we find abnormally high levels of insider trading activity three to four months before the split announcement and in the post-announcement period. As firms usually make their stock split decisions several months before making the announcement, this finding suggests that insiders trade on private information in advance of public disclosure. Moreover, we find that the combination of insider purchases and stock splits induces cumulative abnormal returns that are significantly positive. Overall, our results indicate that firms use stock splits as a signalling mechanism aimed at increasing liquidity and realigning the firm's share price to an optimal trading range.

Keywords: Stock Splits, Insider Trading, Liquidity, Signalling.
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I. Introduction

Do stock splits convey signals to outsiders and help improve corporate liquidity, or are they merely cosmetic corporate events? Although many studies have examined the role of stock splits, the empirical findings are mixed and the debate remains open. For example, although early studies based on the US market find no abnormal share price performance after a stock split (Fama, Fisher, Jensen, and Roll, 1969), most recent studies document significant market reactions to stock split announcements (McNichols and Dravid, 1990; Ikenberry, Rankine, and Stice, 1996; Byun and Rozeff, 2003). Several hypotheses have been proposed to explain the stock split phenomenon, the most popular being the signalling hypothesis, the liquidity hypothesis, and the optimal trading range hypothesis. Second, while stock splits in the US market have been extensively investigated, fewer stock split studies have been conducted in other markets. The exceptions include those conducted by Kryzanowski and Zhang (1993) for the Canadian market and by Kunz and Rosa-Majhensek (2008) for the Swiss market. These studies suggest that the role of stock splits tends to vary in different markets and different sample periods.

This study examines the effect of stock splits in the Hong Kong market to try to determine which hypothesis best explains the stock split phenomenon, and to explore the role of insider trading around stock splits. Specifically, we explore three aspects of stock splits: share price performance, corporate liquidity, and insider trading activity. We first assess abnormal market reactions to stock split announcements using both the market model and the control firm approach to measure abnormal returns. Second, we use high-frequency intraday bid-ask quotations to construct liquidity proxies in terms of bid-ask spread and depth, and compare these liquidity proxies and trading volume in the pre-split and post-split periods. Our third analysis examines insider trading activity around the stock split announcement. Finally, we conduct a regression analysis to identify the hypothesis that best explains the rationale behind stock splits.

This paper contributes to the literature in several ways. First, it extends the international empirical evidence on stock splits to another important stock market: Hong Kong. As one of the largest securities markets in the world and the second largest in Asia, Hong Kong offers a level of efficiency and a financial infrastructure system that are among the best anywhere. Using early data between 1986 and 1992, Wu and Chan (1997) find a positive and significant market response to stock splits in Hong Kong. But whereas they concentrate on the valuation effects of splits and determination of the split factor, we use a larger and more recent sample to provide insights into the relative explanatory power of the liquidity hypothesis, the signalling hypothesis, and the optimal trading range hypothesis. Second, our analysis contributes further to the liquidity hypothesis by using high-frequency intraday data. Stock liquidity has two inseparable dimensions: the price dimension and the size dimension. Previous studies focus on the price dimension

and therefore give only a partial view of liquidity. The microstructural nature of trading data available in Hong Kong provides us with an opportunity to address this weakness of the prior literature by estimating both dimensions of liquidity. We use absolute and relative spreads as our measures of the price dimension and employ volume depth, dollar depth, ask depth, and bid depth as our measures of the size dimension. Finally, and most importantly, our analysis uses insider trading data to contribute further to the signalling hypothesis. Under Hong Kong law (Chapter 396 of the Disclosure of Interest Ordinance) and the Listing Rules of the Hong Kong Exchange, the directors of listed firms are required to disclose their securities transactions to the market within five business days of the date the transaction is conducted on the Hong Kong Exchange; the Exchange in turn publishes information on directors' trading activities in the Securities (Disclosure of Interest) Daily Summary and in the Directors'/Chief Executives' Notification Reports. Using insider trading data to study whether a stock split conveys a signal is appealing because it allows us to bypass the need to specify a performance benchmark.

We find that share price performance is positively and significantly associated with split announcements, which indicates that splitting firms use stock splits to convey favourable information to the market. Our microstructural analysis shows that stock splits generally improve corporate liquidity. The post-split depth measures and trading volumes (spread measures) we calculate are significantly higher (lower) than those in the pre-split period. This enhancement of post-split corporate liquidity supports the liquidity hypothesis. The analysis reports of insider trading activity that we examine indicate abnormal buying and selling activity before a stock split. Because firms usually make their stock split decisions several months before the announcement, this finding suggests that insiders choose to cash in their private information in advance. Moreover, we find that the combination of insider purchases and stock splits induces cumulative abnormal returns that are significantly positive. Finally, our regression analysis presents evidence supporting the liquidity and optimal trading range hypotheses. As argued by Amihud and Mendelson (1988), the greater the liquidity of an asset, the greater its value, and firms may adopt liquidity-increasing policies to mitigate the cost and risk of illiquidity. This suggests that firms use stock splits to convey signals aimed at increasing liquidity and realigning the firm's share price to an optimal trading range. Overall, our empirical results suggest that stock splits have multiple functions: improving liquidity, realigning the trading price, and signalling.

The remainder of this study is structured as follows. Section II presents the literature review and our theoretical propositions. Section III describes the data we use and the method adopted. We report the results in Section IV before discussing our conclusions in Section V.

II. Literature Review and Theoretical Propositions

Many hypotheses have emerged and empirical studies have been conducted to

explain the puzzling market reaction to stock splits. The more prominent hypotheses are the signalling hypothesis, the optimal trading range hypothesis, the liquidity hypothesis, and the tax option hypothesis.

The signalling hypothesis argues that costly stock splits convey information about the current performance and future prospects of splitting firms (Grinblatt, Masulis, and Titman, 1984). Stock splits are costly signals because the fixed component of the brokerage commission increases the post-split per-share trading cost of the lower priced shares (Brennan and Copeland, 1988; Brennan and Hughes, 1991). Evidence confirming positive abnormal returns around the time of stock split announcements supports this hypothesis (e.g. Mukherji, Kim, and Walker, 1997; Ikenberry and Ramnath, 2002).

The liquidity hypothesis is based on the argument that corporate liquidity is affected by the per-share trading price (Maloney and Mulherin, 1992; Muscarella and Vetsuypens, 1996), but the evidence for this hypothesis is mixed. One group of studies indicates that corporate liquidity decreases, rather than increases, after a split (Conroy, Harris, and Benet, 1990). In contrast, another line of studies observes an increase in trading volume during the post-split period and hence supports the liquidity hypothesis (Maloney and Mulherin, 1992; Desai, Nimalendran, and Venkataraman, 1998).

The optimal trading range hypothesis suggests that stock splits are used as tools to realign the share price to a desired price range in order to make buying round lots of shares more affordable for small investors. Stock splits are justified in that they improve the marketability of shares and make post-split shares more attractive to previously wealth-constrained investors (Baker and Gallagher, 1980; Lakonishok and Lev, 1987; McNichols and Dravid, 1990). Stock splits can be used to move the share price into the price range in which the minimum absolute tick size as institutionally mandated is optimal relative to the share price (Angel, 1997).

The optimal trading range hypothesis and the liquidity hypothesis are closely related explanations of the thinking behind stock splits. Firm liquidity can be enhanced when a firm's stock is traded within its optimal trading range, since investors may prefer a specific trading range for each stock (Easley, O'Hara, and Saar, 2001). Therefore, the optimal trading range and liquidity hypotheses are not mutually exclusive explanations for stock splits. In an investigation of managers' motives for stock splits, Baker and Powell (1993) report that liquidity enhancement is perceived to be second in importance only to the desire to move the firm's stock to its optimal trading range.

The tax option hypothesis (Lamoureux and Poon, 1987) suggests that stock splits increase the return volatility of splitting firms and hence allow investors to benefit from tax-timing options.[1] But this hypothesis is irrelevant to our study because Hong Kong

[1] Under the US tax code, preferential treatment is given to long-term capital gains. Short-term capital losses can be used to offset short-term gains. A security with a price that fluctuates wildly presents its holder with the opportunity to realise short-term losses or long-term gains to re-establish short-term status. Investors, however, are not required to pay any tax on capital gains in Hong Kong.

does not tax capital gains or dividend income.[2]

In this study, we focus on several aspects of the impact of stock splits. According to the signalling hypothesis, splitting firms should experience positive abnormal returns. If, according to the optimal trading range hypothesis, the stock split is a device that brings the stock price down to an acceptable level to attract more investors, and wealth-constrained investors in particular, then we predict that the market will react favourably to stock split announcements. We use the event study method to measure the abnormal share price reaction of splitting firms around the time of the stock split announcement. We also examine insider trading activity among directors before the stock split takes place. If the stock split conveys an informative and favourable signal to the market, then directors may use their private information advantage to trade before the news is publicly released. We expect to see significant insider purchases, rather than insider sales, before the occurrence of a stock split. The liquidity hypothesis also leads us to expect significant changes in liquidity patterns (narrower spreads and greater depth) in the post-split period.[3]

III. Data and Method

3.1 Data

We obtain stock split data from the capital distribution file of the PACAP database. This file includes records of the announcement date, the ex-distribution date, and the adjustment factor for stock splits. We retrieve share price return data and accounting data from the company returns file and the financial statement file of the PACAP database, respectively. The database includes information on two types of companies: finance and industrial. Our analysis covers only industrial companies.

We collect insider trading information from the *Inside Trade Asia* database maintained by Primark and from the Securities (Disclosure of Interest) Daily Summary and Directors'/Chief Executives' Notification Reports maintained by the Hong Kong Exchange. The insider trading records we examine include all types of securities transactions resulting in a change in the percentage of shares owned by a director. Our analysis of insider trading activity around stock split announcements examines only

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[2] More recent studies propose the managerial entrenchment hypothesis (Demsetz and Lehn, 1985; Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Kole, 1995). Lakonishok and Lev (1987) show that managers make use of stock splits to enlarge the ownership base in order to reduce the percentage of shares held by large institutional investors. In this way, management makes it more difficult for any one group of shareholders to initiate action against them. Mukherji, Kim, and Walker (1997) find that the number of shareholders increases after a stock split. Limited by the availability of ownership data, we do not test the entrenchment hypothesis.

[3] Some studies investigate the joint signalling role of stock splits and stock dividends (e.g. Grinblatt, Masulis, and Titman, 1984; Banker, Das, and Datar, 1993). These two events are similar since they relate to the firm's stock distribution policy by increasing the number of outstanding shares of stock dividend-paying and splitting firms without changing the proportional ownership of shares held by existing stockholders or the cash flow, assets, or liabilities of such firms. The market responses to these two events, however, may be quite different (Lakonishok and Lev, 1987; Rankine and Stice, 1997). We concentrate on stock splits and insider trading in this study and investigate the possible different market reactions to stock dividend and split announcements in a separate paper.

insider transactions that result in an increase or decrease in the shareholdings of directors through open market purchases and sales of shares. We exclude other types of insider transactions such as options and warrants trading, bonus shares, scrip dividends, and gifts from our sample (Lin and Howe, 1990). Our bid-ask records are sourced from the database maintained by the Research and Planning Division of the Hong Kong Exchange. This database provides intraday trading information such as the ask price, bid price, trading price, trading volume, and traded value of all securities traded on the Hong Kong Exchange at 30-second intervals. We measure only changes in liquidity patterns around stock split announcements for ordinary shares.

Our sample period covers the 21 years from 1980 to 2000 and contains 162 "pure" stock split events.[4] Of these events, nine do not have valid announcement dates. A further 10 stock split announcements are made by finance companies. We use the control firm approach to measure the abnormal share price reaction of firms making split announcements. Selection criteria set using the control firm approach for event studies removes a further 11 events from our sample, leaving us with a final sample of 132 cases for event study analysis.[5] Table 1 reports the summary statistics for the sample. Our analyses of insider trading activity and of changes in liquidity patterns around stock split announcements cover the sample periods from 1993 to 2000 and from 1996 to 2000, respectively, owing to the availability of insider trading and microstructure data.

The average split factor and the average market capitalisation of the splitting firms are 6.73 and HK$4,581,978,000, respectively. A comparison of the average number of shares outstanding for splitting firms with the corresponding industry mean shows that the latter is two times the former. Whereas the average number of shares outstanding is higher across the industry as a whole, the average share price of the splitting firms is 4.5 times higher than that of the industry. The fact that the splitting firms have a higher average pre-split share price than the industry as a whole suggests that splitting firms may be motivated to use stock splits to realign their share prices to their preferred trading range and to lower their share prices to enhance the attractiveness of their stock (Lakonishok and Lev, 1987).

3.2 Method

3.2.1 Abnormal Share Price Reaction

We use the event study method to evaluate the abnormal share price reaction to stock split announcements. The event date, $t = 0$, is the announcement date recorded in the capital distribution file of the PACAP database. We use the market model to estimate abnormal share price reactions to stock split announcements in which the abnormal return on day t, AR_{itm}, is defined as the difference between the realised return of sample firm i and the realised return of the market index (the Hang Seng index).

[4] Following Grinblatt, Masulis, and Titman (1984), our sample consists of pure splits. We select split announcements that are not contaminated by other announcements made over the period around the split announcement date (one month prior and one month after).

[5] To show that our results are not affected by reverse splits, we perform a check on stock consolidation events and find that our sample firms do not consolidate their stock during the period examined.

Table 1 Summary Statistics for the Stock Split Sample

Utilities, properties, consolidated enterprises, industrials, hotels, and miscellaneous are the different industrial classifications for firms in the PACAP database. Sample size shows the number of splitting firms in each industrial sector. We define split factor as the number of new shares exchanged for one old share. Market capitalisation is the market value of the splitting firm. For comparison purposes, we report the number of shares outstanding and share prices of the splitting firms in our sample and provide the industrial averages for the number of shares outstanding and share prices of other firms in each industrial sector.

	Sample Size	Mean Split	(Median) Factor	Market Capitalisation (HK$'000)	No. of Shares Outstanding of Splitting Firms ('000)	Share Price of Splitting Firms (HK$)	Industrial Average No. of Shares Outstanding ('000)	Industrial Average Share Price (HK$)
Utilities	4	4.0000	(2.00)	36,289,748	469,536	64.50	1,729,870	8.17
Properties	39	7.7237	(5.00)	2,841,399	287,901	17.98	539,418	3.52
Consolidated Enterprises	51	6.3431	(5.00)	3,410,268	415,056	10.36	836,868	4.25
Industrials	32	5.4063	(4.50)	5,601,363	345,784	17.99	634,059	2.25
Hotels	4	17.2500	(7.50)	2,666,621	208,869	31.28	290,102	3.68
Miscellaneous	2	3.0000	(3.00)	1,721,865	133,162	15.05	191,848	7.09
Average		6.7328	(5.00)	4,581,978	351,826	16.74	700,538	3.70
Total	132							

We also follow the control firm approach to avoid the potential problem of event clustering in measuring abnormal returns. We use the return of a control firm that does not undergo a stock split event as a benchmark for computing abnormal returns (Barber and Lyon, 1997). Previous studies adopt many different criteria to match control firms (e.g. Fama and French, 1992). For example, McNichols and Dravid (1990) use industry and fiscal year to match control firms, while Byan and Rozef (2003) employ firm size and book-to-market value. We adopt three criteria – firm size, momentum factor, and industry type – to select our control firms for the sample firms.[6]

We proxy firm size by the market value of equity and categorise firms into five groups (groups 1 to 5) according to monthly market values. We use the average monthly return of each firm for the past 12 months to compute the momentum factor and divide firms in two groups – large and small – according to the market value of equity. In either size-based group, we further rank and divide firms into three categories (small, medium, and large) according to their average return over the past 12 months. This gives us six groups of firms formed according to the momentum factor. We match a control firm to

[6] We thank one of the anonymous referees for suggesting that we use the momentum factor in the matching process. As an alternative, we follow a suggestion made by another referee by choosing control firms according to firm size and book-to-market value. The empirical results remain largely unchanged.

a sample firm if the former is in the same industry sector and holds the same ranking labels as the sample firm for market value and the momentum factor.

In addition, since we measure insider trading activity around split announcements, the control firm selected should have neither made a stock split announcement nor had insider transactions conducted in its stock around the sample firm announcement period (from 12 months before until 12 months after the announcement). Using the control firm approach, we estimate the abnormal return on day t, $AR_{itc,}$ as the difference between the realised return of sample firm i and that of the matched control firm j.

Following standard event study procedures (e.g. Brown and Warner, 1985), the test statistic we use to assess the significance of the abnormal return is the standard deviation measured over the estimation period of 200 days from t = -300 to t = -101. Brown and Warner (1985) show that the standard procedures we employ are typically well specified, even when special daily data characteristics are ignored. Our test period runs from t = -60 to t = +600. According to the hypotheses, we expect stock splits to signal favourable information about the value of the splitting firms, bring the share prices of those firms down to a desired price range, increase trading volume, enhance liquidity, and improve marketability. We therefore expect to see a positive market reaction around stock split announcements.

3.2.2 Abnormal Insider Trading Activity

Many studies document that insiders possess private information about current and future firm performance (Seyhun, 1986; Lin and Howe, 1990). Insider trading activities have been found to take place around different types of corporate events such as earnings releases (e.g. Udpa, 1996), seasoned equity offerings (Gombola, Lee, and Liu, 1997), mergers and acquisitions (Meulbroek, 1992), corporate bankruptcy petitions (Seyhun and Bradley, 1997), listings and delistings (Lamba and Khan, 1999), and revisions of analysts' earnings forecasts (Sivakumar and Vijayakumar, 2001). These studies report a "regular" trading pattern for insiders, who buy before good news and sell before bad news. Our analysis of abnormal insider trading activity examines whether directors use inside information about upcoming share split announcements to trade in the market for their own account. We therefore assess whether such activity before split announcements (over a six-month period) differs abnormally from such activity in other periods. Following Gombola, Lee, and Liu (1997), we use the prior-period comparison method to measure abnormal insider trading activity before an announcement. The estimation period used for comparison is a six-month period between m = -12 and m = -7 before the month of the share split announcement (m = 0).

The average of the trading measure (the number of shares traded to the number of outstanding shares, or the market value) over the estimation period ($-12 \leq m \leq -7$) is the expected trading level. We estimate abnormal insider trading activity as the difference between the actual trading level in the examination period ($-6 \leq m \leq +6$) and the expected trading level computed over the estimation period. We also measure the standard

deviation in the estimation period ($-12 \leq m \leq -7$) and use it to test the significance of abnormal trading activity in the examination period ($-6 \leq m \leq +6$) (Brown and Warner, 1985).

3.2.3 Liquidity Pattern (Spread and Depth)

One explanation for positive market reactions to stock splits is that such announcements result in expectations of increased post-split liquidity in the shares of the splitting firm (Maloney and Mulherin, 1992; Muscarella and Vetsuypens, 1996). To examine changes in corporate liquidity caused by stock splits, we compare liquidity patterns in the pre-split and post-split periods in terms of spread and depth. We expect to see a narrower spread and greater depth in the post-split period.

We examine changes in the two liquidity pattern dimensions of spread and depth around split announcements. Spread measures the price aspect of liquidity, while depth measures its size aspect. The spread of a share quantifies the cost of trading. A wider spread indicates a higher cost of trading and hence lower liquidity. Depth reveals the effects of the volume and dollar amount of trading. Greater depth reflects a larger trading volume and dollar value of trading, and hence higher liquidity. These two dimensions exhibit a negative relation (Lee, Mucklow, and Ready, 1993; Brockman and Chung, 1999), that is, a wide (narrow) spread is associated with poor (good) depth. We use two spread measures and four depth measures to assess changes in liquidity.

Absolute spread and relative spread are our two spread measures. We include both in this study since they have relative strengths. Although relative spread is a better measure for representing the transaction cost per dollar traded, it is too sensitive to the change in share price compared with its sensitivity to the trading environment (Miller and McConnell, 1995). Absolute spread is the daily average of the absolute dollar difference between bid and ask quotes recorded at 30-second intervals on day *t*. Relative spread is the daily average of the dollar difference between bid and ask quotes divided by the bid-ask midpoint recorded at 30-second intervals on day *t*. Depth is estimated by volume depth, dollar depth, ask depth, and bid depth. These four depth measures represent different size aspects (trading volume, trading value, buy orders, and sell orders) of liquidity. Volume depth is the sum of the number of shares bid at the highest bid price and the number offered at the lowest ask price recorded (adjusted by the number of outstanding shares) relative to the number of shares outstanding. Dollar depth is the sum of the product of the number of shares bid at the highest bid price and the highest bid price, and the product of the number of shares offered at the lowest ask price and the lowest ask price recorded (adjusted by the product of price and number of outstanding shares) at 30-second intervals on day *t* relative to the market value. Ask (bid) depth is the product of the lowest ask (highest bid) price (adjusted by the number of outstanding shares) and the number of shares offered at the lowest ask (highest bid) price recorded at 30-second intervals on day t relative to the market value.

3.2.4 Regression Analysis

Numerous hypotheses have been proposed and a large number of empirical studies conducted to try to explain positive abnormal returns around announcements. Adopting a similar approach to previous studies, we construct a cross-sectional model to explain the level of cumulative abnormal returns (*CAR*) of splitting firms. We define the model as follows:

$$\begin{aligned} CAR_{it} = \quad & a_0 + \beta_1 VolRatio_{it} + \beta_2 FACTOR_{it} + \beta_3 PriceDev_{it} + \beta_4 ShareDev_{it} + \\ & \beta_5 EPSChg_{it} + \beta_6 Multiple_{it} + \beta_7 MktValue_{it} + \beta_8 HSD_{it} + \beta_9 B/M_{it} + \\ & \beta_{10} RetVar_{it} + \varepsilon_i \end{aligned} \quad (1)$$

Trading volume has commonly been used as a proxy of liquidity (Datar, Naik, and Radcliffe, 1998; Amihud, 2002). To examine the liquidity hypothesis, we include *VolRatio* in the regression model. *VolRatio* denotes the ratio of pre-split to post-split trading volume normalised by the number of shares outstanding.[7]

The optimal trading range hypothesis posits the existence of a share price range that is favourable to improving share marketability. The size of the split factor is a signal to the market about the desired trading range in equilibrium and the extent of a firm's private information about future earnings (Brennan and Copeland, 1988; Brennan and Hughes, 1991). A large split factor indicates that the current share price is far outside the favourable trading price range. We include the size of the split factor (*FACTOR*) in our regression model to control for the effect of the split size. *FACTOR* is defined as the natural logarithm of the size of the split factor.

Lakonishok and Lev (1987) suggest that the split factor is driven by the deviation between the share price of the splitting firm and the market- or industry-wide average price. Stock splitting is used to bring the share price down to the preferred share price range the firm considers appropriate, a price range normally shaped by the median or average price level of the industry or market concerned. We use two variables, *PriceDev* and *ShareDev*, to examine the optimal stock price hypothesis. *PriceDev* is the natural logarithm of the deviation of the share price from the industry median price; *ShareDev* is the natural logarithm of the deviation of the number of shares outstanding from the industry median of the number of shares outstanding. The larger the deviation from the median value, the higher the abnormal return should be. We therefore expect *PriceDev* and *ShareDev* to be positively related to abnormal returns.

In response to the argument that stock splits have the effect of signalling the undervaluing of a firm's shares, Asquith, Healy, and Palepu (1989) provide evidence to suggest that splitting firms usually have better earnings performance before the split and that returns around split announcements are related to prior earnings growth. We

[7] The number of outstanding shares before the split announcement differs from that after the announcement. To better compare changes in trading activity before and after the announcement, we standardise trading volume according to the number of outstanding shares.

therefore include a variable *EPSChg*, which we compute as the percentage change in earnings per share for the current year compared with average earnings per share for the previous three years.

Pilotte and Manuel (1996) find that the market reaction is more favourable if the current stock split is preceded by a previous split. According to the efficient market hypothesis, the share price reaction should be less pronounced for the subsequent split announcement for which there is no signalling motivation. The optimal trading range hypothesis argues that repeated splits imply the superior performance of the splitting firm in using splits to periodically lower its share price. Huang, Liano, Manakyan, and Pan (2008) have recently suggested that frequent splits are more consistent with the trading range–improved liquidity hypothesis, while infrequent splits are more consistent with the signalling hypothesis. To assess the merits of these arguments and the difference in abnormal returns caused by repeated splits, we include *Multiple* to examine the effect of split frequency. *Multiple* is a dummy variable that takes the value of 1 if more than one split announcement is issued over the sample period.

Smaller firms generally make less information available to the market than larger firms. If a stock split serves a signalling function, then the informativeness of the signal conveyed by a small firm's announcement of a stock split should be higher than that conveyed by a large firm's announcement. Therefore, abnormal returns around split announcements should be higher for small than for large firms (Ikenberry, Rankine, and Stice, 1996). We use firm size (*MktValue*) as a proxy for information asymmetry and expect a negative relation between abnormal return and *MktValue*.[8] We measure MktValue as the natural logarithmic market value of a firm in the month before the split announcement.

HSD is a dummy variable which takes the value of 1 if the yearly average daily return of the Hang Seng index is positive and 0 otherwise. *BkMkt* denotes the ratio of book value to the market value of equity. We include *HSD* and *BkMkt* as control variables in our regression model, since these factors may interact with the liquidity measures. Finally, many studies document increases in return volatility following stock splits (Lamoureux and Poon, 1987; Dubofsky, 1991; Koski, 1998; Gray, Smith, and Whaley, 2003). We therefore also include the standard deviation of return (*RetVar*) in the regression.

IV. Empirical Results

4.1 Abnormal Share Price Reaction

The signalling hypothesis argues that one motivation for a firm to split its shares is that it is optimistic about the potential for its share price to increase in future. Stock split

[8] We use the number of financial analysts following the firm as an alternative proxy for information asymmetry. But data availability is quite limited, since IBES analysts' forecasts are more readily available for recent years and for large firms. Moreover, using the number of analysts' forecasts as a proxy for information asymmetry is not feasible. In addition to using market value as a proxy for firm size, we also use total assets as the size measurement and re-run the regression model. The results are qualitatively the same.

announcements should therefore lead to positive share price performance. Table 2 reports the market reaction of the splitting firms over different time periods from t = -60 to t = +600. Figure 1 portrays the cumulative abnormal return path based on the market model. The abnormal returns are mostly positive from a pre-announcement period of 60 days to a post-announcement period of 600 days. We find positive abnormal returns that are significant at the 0.01 level for the three days around the announcement date. The three-day cumulative abnormal return ($-1 \leq t \leq +1$) is 5.08 per cent using the market model and 4.91 per cent using the control firm approach. The positive abnormal return results thus suggest that stock splits signal favourable information to the market. Comparing abnormal returns around the announcement date with those in the pre-split period ($-60 \leq t \leq -1$), we find that the magnitude of abnormal returns is as high as 35 to 42 per cent. These high pre-split abnormal returns may result from the leakage of insider information about the impending split announcement. The optimal trading range hypothesis, however, suggests that a high pre-split stock price may be a motive encouraging the firm to make the stock split decision and bring its stock price back down to the optimal trading range.[9] To test this hypothesis, we focus on examining post-announcement returns in the regression analysis.

Asquith, Healy, and Palepu (1989) suggest that the information conveyed by stock split announcements may persist for years following the split. Ikenberry, Rankine, and Stice (1996) and Desai and Jain (1997) provide further evidence to indicate that stock splits result in long-term excess returns. Our market model results show that long-term abnormal returns over the post-split periods of $-1 \leq t \leq +200$, $-1 \leq t \leq +400$, and $-1 \leq t \leq +600$ are positive, although they are significant only for the $-1 \leq t \leq +600$ interval. The cumulative abnormal return from 60 days before to 600 days after the split announcement, as portrayed in Figure 1, is persistently maintained at a very high level of around 40 per cent for up to 600 days. These results thus provide evidence that, in the long run, stock splits affect the share price performance of splitting firms from the pre-split to the post-split periods.

4.2 Abnormal Insider Trading Activity

In this section, we use data on abnormal insider trading activity to assess further the informativeness of the split signal. Intuitively, and leaving legal issues to one side for the moment, given that insiders are aware of the impending corporate news of a stock split and expect a positive market reaction to such news, they should buy shares of the splitting firm before the stock split announcement is made. We therefore expect to see significant buying activity among splitting firm insiders. Panel A of Table 3 reports the results of our abnormal insider trading analysis in which we use the market value of

[9] We thank an anonymous referee for suggesting this insight.

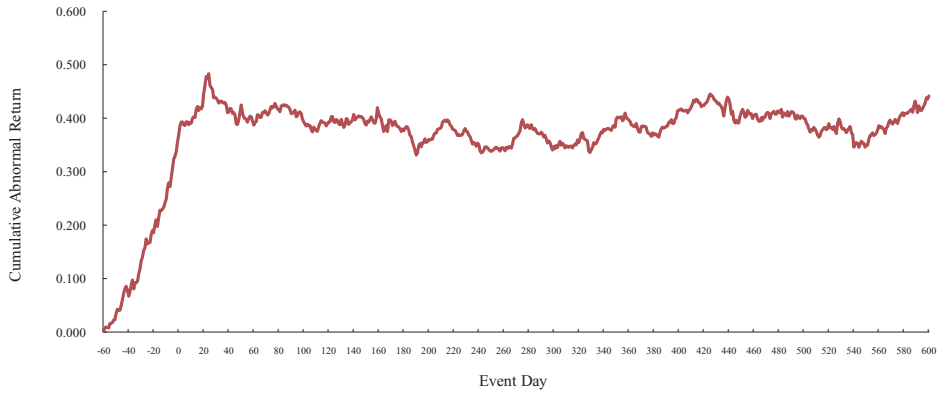
Table 2 Abnormal Returns around Stock Split Announcements

For the market model, we define the abnormal return on day *t*, $AR_{itm,}$ as the difference between the realized return of sample firm *i* and the realised return of the market index (which is the return on the Hong Kong Hang Seng index). Under the control firm approach, we estimate the abnormal return on day *t*, AR_{itm} as the difference between the realised return of sample firm *i* and the realised return of matched control firm *j*. We use three criteria (firm size, momentum factor, and industry type) to select our control firms for the sample firms. The event window is from t = -60 to t = +600.

Event Window	Abnormal Return (Market Model) (t-statistics)	Abnormal Return (Control Firm Approach) (t-statistics)
-60, -1	0.4218	0.3549
	(13.02)**	(7.01)**
-30, -1	0.2463	0.2377
	(10.76)**	(6.64)**
-10, -1	0.1018	0.1131
	(7.70)**	(5.47)**
-1, +1	0.0508	0.0491
	(7.02)**	(4.34)**
0	0.0168	0.0146
	(4.03)**	(2.24)*
-3, +3	0.0892	0.0694
	(8.07)**	(4.01)**
-5, +5	0.1040	0.0985
	(7.50)**	(4.55)**
-10, +10	0.1349	0.1486
	(7.04)**	(4.96)**
-1, +30	0.1255	0.1004
	(5.31)**	(2.72)**
-1, +60	0.0903	0.0497
	(2.74)**	(0.97)
-1, +100	0.0652	0.0559
	(1.54)	(0.85)
-1, +200	0.0313	0.0229
	(0.53)	(0.25)
-1, +400	0.0383	0.0782
	(0.46)	(0.60)
-1, +600	0.2109	0.1045
	(2.06)*	(0.65)

** and * indicate significance at the 1% and 5% levels, respectively.

Figure 1 Cumulative Abnormal Return Path



shares as the insider trading measure.[10] We use three variables – "buy," "sell," and "net (difference between purchases and sales)" – to assess the intensity of trading activity in different trading directions.[11] In addition, we divide the sample into three categories – "net buy," "net sell," and "no insider trading" – according to the insider trading strategies adopted during the three-month period from m = 0 to m = +2 and measure their respective abnormal returns. Net buy (sell) means that the market value of shares purchased is higher (lower) than the market value of shares sold. "No insider trading" means that no insider trading activity occurs. Panel B of Table 3 reports the results, and Figure 2 exhibits the cumulative abnormal return paths.

In the pre-split period of $-6 \leq m \leq -1$, we find significant buying and selling activity between m = -6 and m = -3. But a comparison of trading activity between $-6 \leq m \leq -3$ and $-2 \leq m \leq -1$ shows that trading activity in the latter period is trivial. This immaterial trading activity in the two months immediately before the month of the split announcement may be owing to the potential threat of investigation for trading on the basis of private and price-sensitive information. Insiders may therefore choose to cash in their private information in advance (the split decision is usually made several months before the announcement). Indeed, we observe significant net purchases of shares in m = -4 and subsequently significant net sales of shares by insiders in m = -3. The high level of insider selling activity in the pre-announcement period may result from the availability of high pre-split abnormal returns (as shown in Figure 1), which in turn may entice insiders to sell their holdings and realise capital gains.

For cumulative abnormal trading activity ($-6 \leq m \leq -1$), the abnormal market values of purchases and sales are 54.99 and 18.52, respectively, which are significant at the 0.01 and 0.05 levels, respectively. These abnormal market values suggest that firm

[10] Following the suggestion of an anonymous referee, we also conduct the analysis using the proportion of the number of shares traded to the number of outstanding shares and the number of transactions as the insider trading measures. The results are qualitatively the same as those derived using market value.

[11] A positive value for net means that the value of purchases is higher than that of sales.

shares bought (sold) by directors in the six-month examination period ($-6 \leq m \leq -1$) are valued at $54.99 million ($18.52 million) higher than those bought (sold) in the six-month estimation period ($-12 \leq m \leq -7$) before the split announcement. The net cumulative abnormal market value is 14.96, which is significant at the 0.05 level. Although there is also significant selling activity in the pre-split period, our finding that the net cumulative abnormal market value is positive in the $-6 \leq m \leq -1$ period provides some evidence to show that stock splits signal favourable information to the market and that insiders trade in anticipation of such favourable signals.

When we divide the sample into "net buy", "net sell", and "no insider trading" sub-samples in Panel B of Table 3, we find significant positive abnormal returns for the "net buy" sub-sample, whereas the abnormal returns for the "net sell" and "no insider trading" sub-samples are negative but insignificant. This finding suggests that the combination of insider purchases and a stock split conveys favourable information to the market about the future prospects of the splitting firm (Grinblatt, Masulis, and Titman, 1984).

4.3 Liquidity Pattern (Spread and Depth)

To test the liquidity hypothesis, we compare changes in corporate liquidity in both the price and size dimensions around the split announcement. To avoid the potential effect of any temporary increase in trading just before and following the split resulting from the split announcement itself, we exclude the period from 20 days before until 20 days after the announcement from our examination of liquidity pattern changes.[12] The pre-split and the post-split periods are defined as the 20 trading days before and the 20 days following the excluded period around the split announcement. We conduct both the parametric two-sample *t*-test and the non-parametric Mann-Whitney test for sample differences. Table 4 reports the test results. Improved liquidity is evidenced by a lower post-split spread and a greater post-split depth.[13]

We find that the two measures of spread – absolute spread (0.088 versus 0.024) and relative spread (0.023 versus 0.021) – decrease from the pre-split to the post-split periods. The decrease in the absolute spread is significant at the 0.01 level in both the parametric and non-parametric tests for sample differences. Although the fall in relative spread is not as pronounced as that in absolute spread, the mean difference of the pre-split and post-split spread levels is also significant at the 0.01 level in the parametric test. A narrower post-split spread suggests an increase in liquidity following stock splits.

[12] The exclusion from the analysis of a certain period following the split announcement is similar to excluding the period between the split announcement date and the ex-split date. In the microstructural examination of stock splits, Conroy, Harris, and Benet (1990), Ferris, Hwang, and Sarin (1995), and Desai, Nimalendran, and Venkataraman (1998) also exclude from their analyses the period around the announcement date and the ex-split date to avoid information contamination around the former, transient microstructural effects around the latter, and distortions resulting from dual trading in both pre-split and when-issued shares.

[13] In addition to using the examination periods of 20 days before and 20 days after the excluded period around the split announcement, we repeat the comparison analysis using various examination windows of ±10 days, ±15 days, ±20 days, ±25 days, ±35 days, and ±40 days to demonstrate the robustness of our results. The length of the examination window does not affect the results of a narrower spread and greater depth in the post-split period.

Table 3 Abnormal Insider Trading Activity in Terms of Market Value around Stock Split Announcements

The "buy" subsample consists of events in which there is a purchase (sale) of shares, and the "sell" subsample in which there is a sale of shares. The net subsample consists of events in which there is a net purchase of shares (the market value of purchased shares exceeds the market value of sold shares). A positive (negative) value for "net" means that the market value of purchased shares is higher (lower) than the market value of sold shares. The abnormal market value of purchases (sales) of 0.1227 (-8.3660) suggests that in month -6, directors buy (sell) firm shares of a value \$0.1227 million (-\$8.3660 million) higher (lower) than the monthly average in the six-month estimation period covering ($-12 \leq m \leq -7$) before the split announcement. The abnormal market value of purchases (sales) of 54.990 (18.521) suggests that in the six-month examination period covering ($-6 \leq m \leq -1$), directors buy (sell) firm shares with a value \$54.990 million (\$18.521 million) higher (lower) than those bought (sold) in the six-month estimation period covering ($-12 \leq m \leq -7$) before the split announcement. The net cumulative abnormal market value, which is the difference between purchases and sales, is \$14.956 million and is significant at the 5 per cent level. "Net buy (sell)" means that the market value of purchased shares is higher (lower) than the market value of sold shares. The abnormal return on day t, $AR_{itc,}$ is measured using the control firm approach as the difference between the realised return of sample firm i and that of matched control firm j. We use three criteria (firm size, momentum factor, and industry type) to select our control firms for the sample firms.

Panel A: Abnormal Insider Trading Activity Analysis

	Buy	Sell	Net
Event Month	Abnormal Insider Trading Activity (t-statistics)		
-6	0.1227	-8.3660	6.4069
	(0.07)	(-2.26)*	(2.46)*
-5	-1.4532	1.9969	-2.5852
	(-0.77)	(0.54)	(-0.99)
-4	43.5668	-3.4587	25.2576
	(23.19)**	(-0.94)	(9.71)**
-3	17.9388	30.4667	-12.6121
	(9.55)**	(8.24)**	(-4.85)**
-2	-1.8424	-1.3124	-0.0507
	(-0.98)	(-0.36)	(-0.02)
-1	-3.3431	-0.8058	-1.4603
	(-1.78)	(-0.22)	(-0.56)
0	3.0762	8.3423	-4.4231
	(1.64)	(2.26)*	(-1.70)
+1	2.3441	-0.4135	1.8006
	(1.25)	(-0.11)	(0.69)

Event Month	Buy	Sell	Net
	Abnormal Insider Trading Activity (t-statistics)		
+2	2.4120	5.1755	-1.7471
	(1.28)	(1.40)	(-0.67)
+3	20.2183	21.6708	-0.3480
	(10.76)**	(5.86)**	(-0.13)
+4	10.9653	3.7529	4.8274
	(5.84)**	(1.02)	(1.86)
+5	2.1259	25.0936	-15.6405
	(1.13)	(6.79)**	(-6.02)**
+6	-1.1683	-3.2408	1.2183
	(-0.62)	(-0.88)	(0.47)
-6 to -1	54.9898	18.5207	14.9561
	(11.95)**	(2.05)*	(2.35)*

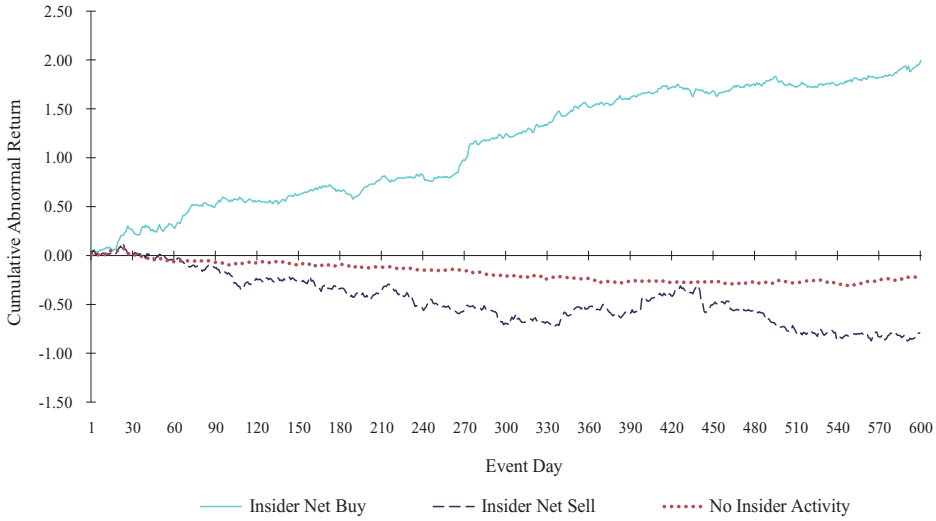
** and * indicate significance at the 1% and 5% levels, respectively.

Panel B: Abnormal Returns

Event Window	Cumulative Abnormal Return (t-statistics)			
	Whole Sample	Insider Net Buy	Insider Net Sell	No Insider Trading Activity
+1, +30	0.0681	0.2693	0.0125	0.0113
	(1.90)	(3.04)**	(0.11)	(0.29)
+1, +60	0.0175	0.2963	-0.0458	-0.0643
	(0.34)	(2.37)*	(-0.28)	(-1.16)
+1, +100	0.0236	0.5669	-0.1768	-0.0974
	(0.36)	(3.51)**	(-0.84)	(-1.36)
+1, +120	0.0233	0.5491	-0.2341	-0.0746
	(0.33)	(3.10)**	(-1.02)	(-0.95)
+1, +150	0.0179	0.6147	-0.2621	-0.0971
	(0.22)	(3.10)**	(-1.02)	(-1.11)
+1, +200	-0.0094	0.7022	-0.4070	-0.1258
	(-0.10)	(3.07)**	(-1.37)	(-1.25)
+1, +400	0.0460	1.6600	-0.4457	-0.2603
	(0.35)	(5.14)**	(-1.06)	(-1.82)
+1, +600	0.0722	1.9663	-0.7922	-0.2243
	(0.45)	(4.97)**	(-1.54)	(-1.28)

** and * indicate significance at the 1% and 5% levels, respectively.

Figure 2 Cumulative Abnormal Return Path



For the four measures of depth – volume depth (0.187 versus 0.296), dollar depth (0.231 versus 0.451), ask depth (0.109 versus 0.250), and bid depth (0.123 versus 0.201) – the increase in the depth level from the pre-split to the post-split periods indicates an improvement in corporate liquidity. In particular, the post-split increase in depth is statistically significant for volume depth, dollar depth, and ask depth.

To measure whether stock splits enhance or reduce trading activity, we compare trading volume and market value in the pre-split and post-split periods. Maloney and Mulherin (1992) and Desai, Nimalendran, and Venkataraman (1998) report a post-split increase in trading volume and conclude that it constitutes evidence of increased liquidity. In Table 4, we observe that both the average number (0.011 versus 0.032) and the market value (0.011 versus 0.032) of shares traded increase substantially. These findings suggest that by reducing the share price to a lower trading range, split shares become more marketable, thus enhancing trading activity.

There is a significant difference between average pre-split and average post-split share prices, suggesting that splitting firms use stock splits to reduce their share price to a preferred level. The pre-split price is three times the post-split price (6.530 versus 2.182). Consistent with the finding for the US market (e.g. Gray, Smith, and Whaley, 2003), while the share price decreases substantially in the post-split period, return volatility increases significantly as a result of the split (0.007 versus 0.011). While a lower price may improve the attractiveness of shares, increased return volatility adversely affects their marketability. There are two possible explanations for our finding of higher return volatility in the post-split period. Ohlson and Penman (1985) and Dravid (1987) argue that the greater return volatility in the post-split period results from a wider spread

following the split. Karpoff (1987) explains that the increased return volatility may be owing to the positive relation between volatility and trading volume following the split. Jones, Kaul, and Lipson (1994) further argue that enhanced trading activity brings information to the market and hence affects share prices and return volatility. Because we observe only greater trading volume and not wider spreads following splits, our higher return volatility result should be mainly attributable to increased trading activity.

Our sample comparison results show that a narrower spread, greater depth, and higher trading volume follow a split announcement. Consistent with the liquidity hypothesis, our findings provide evidence to show that stock splits improve the liquidity of shares.

4.4 Regression Analysis

Table 5 reports the results of the regression model (1);[14] Panels A and B respectively show the descriptive statistics and regression results for the variables.[15] We adjust the *t*-values for the coefficients for heteroskedasticity using White's procedure (1980).

If the stock split is motivated by liquidity reasons in an effort to lower the share price and enhance trading activity, then we expect an inverse relation between abnormal return and *VolRatio*. In Table 5, the coefficients on *VolRatio* are negative, which suggests that the positive abnormal returns observed can be attributed to enhanced liquidity following the split.

The optimal trading range hypothesis posits the existence of a favourable share price range that will improve share marketability. Consistent with this hypothesis, we find that *PriceDev* is positively significant; however, *ShareDev* is not significant. This result suggests that the market reacts more positively to share splits in firms whose share prices are higher than the industry median price. Our finding provides evidence supporting the optimal trading range hypothesis that one motivation for stock splits is to return the share price to a level consistent with the share prices of other firms in the industry or to an optimal trading range. A larger split factor results in a greater reduction in the ex-split share price and hence a smaller round lot investment requirement. Table 5, however, shows that the size of the split factor, *FACTOR*, is not significant. Following Peterson and Peterson (1992), we also use an alternative method to estimate the target share price and re-run the regression model. We find similar results, suggesting that our findings supporting the optimal trading range hypothesis are robust to the different measurements of the desirable trading price.

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[14] Data on insider trading activity are available from 1993 to 2000, while intraday data are available from 1996 to 2000. Because including both variables in the regression analysis would significantly reduce the sample size, we use trading volume (*VolRatio*) as the measure of liquidity and earnings change (*EPSChg*) as the measure of signalling.

[15] To show that our regression model is free of the multicollinearity problem, we measure VIF (variance inflation factor) values for our independent variables; these values are less than 2, indicating no problem with multicollinearity in our model.

Table 4 Sample Comparison of Liquidity Patterns around Stock Split Announcements

We define the pre-split and post-split periods as the 20 trading days before and following the exclusion period (i.e. from 20 days before until 20 days after the announcement date) around the split announcement, respectively. *PRICE* is the daily average trading price taken at 30-second intervals. We estimate *RETURN* by taking the natural log of the contemporaneous average bid-ask to its respective lagged average taken at 30-second intervals. *VOLATILITY* is the standard deviation of the daily continuous return. *VOLUME* is the daily total trading volume adjusted by the number of outstanding shares. Market value is the daily market value of traded shares adjusted by the market value of the firm. Absolute spread is the daily average of the absolute dollar difference between asks and bids recorded at 30-second intervals on day *t*. Relative spread is the daily average of the dollar difference between asks and bids divided by the bid-ask midpoint recorded at 30-second intervals on day *t*. Volume depth is the sum of the number of shares bid at the highest bid price and the number of shares offered at the lowest ask price recorded at 30-second intervals on day *t* (adjusted by the number of outstanding shares). Dollar depth is the sum of the product of the number of shares bid at the highest bid price and the highest bid price, and the product of the number of shares offered at the lowest ask price and the lowest ask price recorded at 30-second intervals on day *t* (adjusted by the market value of the firm). Ask depth is the product of the number of shares offered at the lowest ask price and the lowest ask price recorded at 30-second intervals on day *t* (adjusted by the number of outstanding shares). Bid depth is the product of the number of shares bid at the highest bid price and the highest bid price recorded at 30-second intervals on day *t*.

	Pre-split Period	Post-split Period	t-statistics for Mean Difference
PRICE	6.530	2.182	17.152[**b]
RETURN	0.000	-0.001	2.294[*b]
VOLATILITY	0.007	0.011	-2.799[**b]
VOLUME	0.011	0.032	-5.260[**b]
Market Value	0.011	0.032	-5.254[**b]
Absolute Spread	0.088	0.024	25.589[**b]
Relative Spread	0.023	0.021	2.423[*]
Volume Depth	0.187	0.296	-2.400[*b]
Dollar Depth	0.231	0.451	-3.446[**a]
Ask Depth	0.109	0.250	-4.793[**b]
Bid Depth	0.123	0.201	-1.534[b]

[a] The mean difference between the results for the pre-split and post-split periods is significant at the 0.05 level using the Mann-Whitney test.

[b] The mean difference between the results for the pre-split and post-split periods is significant at the 0.01 level using the Mann-Whitney test.

** and * indicate significance at the 1% and 5% levels, respectively.

A number of previous studies provide evidence to suggest that splitting firms usually have better earnings performance before the split and that the split announcement return is related to prior earnings growth. But in contrast with the finding of Asquith, Healy, and Palepu (1989) for the US market, Table 5 shows that *EPSChg* is not significant,

thus suggesting that the split return is not related to prior earnings performance in Hong Kong.[16]

We observe that some firms (9.87 per cent) conduct more than one split over the course of our sample period. To assess the difference in the abnormal return owing to repeated splits, we include *Multiple* to examine the effect of split frequency. Table 5 shows that none of the coefficients on *Multiple* are significant, suggesting that repeated split announcements provide no additional signals to the market. This result is consistent with the argument of Huang, Liano, Manakyan, and Pan (2008) that frequent splits are more consistent with the trading range–improved liquidity hypothesis.

We find that the coefficient on *MktValue* is negative but not significant. One possible reason for the insignificance of *MktValue* in our regression model may be that we control for firm size in selecting a matching firm for measuring abnormal returns. The other two control variables, *HSD* and *BkMkt*, are also insignificant.

Finally, we find a positive relation between return volatility (*RetVar*) and abnormal return over the post-split period of $-1 \leq t \leq +30$. As noted earlier, because we observe narrower (increased) rather than wider (decreased) post-split spreads (trading activity) in the post-split results reported in Table 4, we attribute the positively significant relation between return volatility and split abnormal returns to the higher liquidity of the splitting firms' shares.

We conduct a number of sensitivity tests to show that our regression results are robust to alternative testing methods and computation methods for the variables. Similar to our analysis for the liquidity pattern reported in Table 4, we use different periods to measure *VolRatio* in order to demonstrate that our regression results in Table 5 are not sensitive to the period over which we measure our liquidity variable. In Table 5, *VolRatio* is computed using the average trading volume for 60 days in the pre-split and post-split periods. We repeat the analysis using periods of ±10 days, ±15 days, ±20 days, ±25 days, ±30 days, ±35 days, ±40 days, ±45 days, ±50 days, and ±55 days. We find similar results regardless of the length of the period used to measure *VolRatio*.

V. Conclusion

We use data on daily trading, insider trading, and high-frequency intraday bid-ask spreads to study the effect of stock splits and insider trading on share prices in Hong Kong. We first investigate abnormal market reaction to stock split announcements. In line with the results of many other studies in different capital markets, we find that splitting firms provide significant abnormal returns around the time of the announcement. This positive reaction may be attributable to favourable signals of improved liquidity and the attempt of firms to realign their share price to an optimal trading range.

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[16] We compute the results for *ESPChg* reported in Table 5 using net income. To demonstrate its robustness, we also use another variable – income from operations – to repeat the regression analysis. The results are qualitatively the same.

Table 5 Regression Analysis

$$CAR_{it} = a_0 + \beta_1 VolRatio_{it} + \beta_2 FACTOR_{it} + \beta_3 PriceDev_{it} + \beta_4 ShareDev_{it} + \beta_5 EPSChg_{it} + \beta_6 Multiple_{it} + \beta_7 MktValue_{it} + \beta_8 HSD_{it} + \beta_9 B / M_{it} + \beta_{10} RetVar_{it} + \varepsilon_i \quad (1)$$

CAR is the cumulative abnormal return over the different periods examined ($-1 \leq t \leq +30$, $-1 \leq t \leq +60$, $-1 \leq t \leq +100$, and $-1 \leq t \leq +200$). We measure the abnormal return on day *t*, $AR_{itc,}$ using the control firm approach as the difference between the realised return of sample firm *i* and that of matched control firm *j*. We use three criteria (firm size, momentum factor, and industry type) to select our control firms for the sample firms. *VolRatio* is the ratio of pre-split to post-split trading volume normalised by the number of shares outstanding. *FACTOR* is the natural logarithm of the size of the split factor. *PriceDev* is the natural logarithm of the deviation of the share price from the industry median price. *ShareDev* is the natural logarithm of the deviation of number of shares outstanding from the industry median for the same. *EPSChg* is the percentage change in earnings per share for the current year compared with average earnings per share for the previous three years. *Multiple* is a dummy variable that takes the value of 1 if there is more than one split announcement over the sample period from 1980 to 2000. *MktValue* is the natural logarithm of the market value (the product of price and number of shares outstanding) of the firm for the month before the split announcement. *HSD* is a dummy variable which takes the value of 1 if the yearly average daily return of the Hang Seng index is positive, and 0 otherwise. *BkMkt* is the ratio of book value to market value of equity. *RetVar* is the standard deviation of return. We adjust the t-values for the coefficients for heteroskedasticity using White's procedure (1980).

Panel A: Descriptive Statistics

	Mean	Median	Maximum	Minimum	Standard Deviation
VolRatio	2.3884	1.2747	16.9779	0.0005	3.1782
FACTOR	1.4276	1.3863	3.9120	0.0000	0.6670
PriceDev	1.5493	1.5597	5.4951	-1.9901	1.5960
ShareDev	12.1983	12.4350	15.7564	8.8232	1.1401
EPSChg	0.0329	0.1106	1.6301	-1.4541	0.7820
MktValue	13.9602	13.6175	18.2747	10.0237	1.6688
HSD	0.4615	0.0000	1.0000	0.0000	0.5013
BkMkt	0.7647	0.5411	5.2321	0.0063	0.9062
RetVar	0.0448	0.0386	0.1027	0.0151	0.0203

Because it is difficult to differentiate signalling effects from liquidity effects when observing positive price reactions to stock split announcements, we use abnormal insider trading activity to assess the informativeness of the split signal. We find abnormally high levels of insider trading activity three to four months before the split announcement and

Panel B: Regression Results

	Beta Coefficient (t-statistics)			
	$-1 \leq t \leq +30$	$-1 \leq t \leq +60$	$-1 \leq t \leq +100$	$-1 \leq t \leq +200$
Intercept	0.3949 (1.06)	0.0988 (0.24)	0.1329 (0.26)	0.3401 (0.44)
VolRatio	-0.0239 (-2.38)*	-0.0333 (-3.95)**	-0.0265 (-1.96)*	-0.0492 (-3.09)**
FACTOR	-0.0109 (-0.29)	-0.0685 (-1.16)	-0.1009 (-1.33)	-0.1251 (-1.24)
PriceDev	0.0355 (2.42)*	0.0757 (2.81)**	0.0785 (2.26)*	0.0588 (1.08)
ShareDev	-0.0360 (-1.13)	0.0016 (0.05)	-0.0245 (-0.68)	-0.0392 (-0.78)
EPSChg	-0.0466 (-1.49)	-0.0652 (-1.39)	-0.0965 (-1.89)	-0.0731 (-0.82)
Multiple	-0.0290 (-0.41)	-0.1618 (-1.86)	-0.1127 (-1.10)	0.1523 (0.80)
MktValue	-0.0038 (-0.19)	-0.0106 (-0.47)	0.0093 (0.30)	0.0134 (0.29)
HSD	0.0503 (1.14)	0.0333 (0.38)	0.0835 (0.80)	0.1272 (0.84)
BkMkt	-0.0304 (-1.02)	-0.0153 (-0.56)	-0.0060 (-0.17)	-0.0624 (-0.91)
RetVar	3.9134 (2.72)**	2.7544 (1.51)	2.6103 (0.90)	2.0407 (0.48)
Adj R^2	0.1959	0.1232	0.0622	0.0678
F-statistic	3.1433	2.2511	1.5904	1.6541
p-value	0.00	0.02	0.12	0.11

** and * indicate significance at the 1% and 5% levels, respectively.

in the post-announcement period; insider trading activity in the two months immediately before the split announcement, on the other hand, is immaterial. Since firms usually make their stock split decisions several months before the announcement, this finding suggests that insiders choose to cash in their private information in advance. Another explanation for this finding is that it is more appropriate for insiders to trade in the firm's securities in the post-announcement period to avoid accusations of illegal trading. Moreover, we find that the combination of insider purchases and stock splits induces significantly positive cumulative abnormal returns.

Our microstructural analysis shows that stock splits improve liquidity. We find that spreads are significantly narrower in the post-split than in the pre-split period, and that stock splits also significantly improve the depth of trading. Our regression analysis also corroborates our finding that trading volume increases following a stock split. This suggests the presence of a possible signalling role for split announcements that are confounded by increased liquidity.

Overall, our results indicate that firms use stock splits as a signalling mechanism that allows them to increase liquidity and realign the firm's share price to an optimal trading range.

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