

股改对价反映了公司的盈利和风险吗？*

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摘要

本文对股权分置改革中(以下简称“股改”)影响非流通股股东支付对价的基本因素进行了研究,考察了对价是否反映公司的盈利和风险这些基本面的因素。实证结果表明:在股改中,对价的确反映了公司的盈利能力和风险,公司的盈利能力和盈利质量越高,非流通股股东支付的对价越低;股票回报率风险越高,非流通股股东支付的对价越高。但是,盈利和风险这些基本信息在对价中的反映主要是由机构投资者的参与所导致,即机构投资者参与程度越高,盈利能力和风险反映到对价之中的能力越强,表明机构投资者在对价谈判中考虑了公司信息的基本面,而在非机构投资者为主的公司,对价则主要依据非基本面的信息。

关键词:股权分置改革、对价、每股收益、股票回报率波动性

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一、引言

股权分置为流通股和非流通股是中国资本市场区别于境外资本市场的一个特有现象，³ 股权分置影响证券市场预期的稳定和价格发现功能，使公司治理缺乏共同的利益基础，不利于资本市场健康的发展。为解决股权分置这一历史遗留问题，学术界和实务界都进行了长期的思考，监管当局也做了长期的探索。⁴ 中国证监会（CSRC）于2005年4月29日发布了《关于上市公司股权分置改革试点有关问题的通知》，这一通知拉开了股权分置改革试点的序幕，根据这一通知，证监会于2005年5月9日和2005年6月20日确定了两批股改试点公司。在试点结束以后，国家五部委⁵ 于2005年8月23日联合发布《股权分置改革指导意见》；随后，中国证监会也于2005年9月4日发布了《上市公司股权分置改革管理办法》。《指导意见》和《管理办法》标志着我国股权分置改革进入了全面股改阶段，截至2005年11月30日，沪深证交所共有299家公司公布股改方案，其中181家公司的股改方案已经实施。⁶

股权分置改革中最为核心的问题是，如何确定非流通股股东为获得上市流通权而向流通股股东支付的对价。对价的合理与否，直接影响到流通股股东和非流通股股东的切身利益，关系到股改方案能否顺利通过。股权分置改革涉及参与各方复杂的博弈，影响对价的因素很多，我们关心的是：在流通股股东与非流通股股东确定对价的博弈过程中，是否存在一个基本的参照？因而，我们提出的基本问题是：公司的盈利能力和风险水平这些基本信息是否反映到股改的对价之中？⁷ 机构投资者的参与程度是否影响对价反映这些因素？通过对这个问题的研究，除了可对股改实务提供可能的借鉴外，也有一些理论上的贡献。

³ 尽管在国外，也存在一些流通受到限制的股票，比如根据美国证券交易委员会（SEC）144号的规定，有些公司的股票有两年的限售期。但这种流通受限的股票与我国的非流通股票有所不同，主要表现在我国的非流通股票没有明确的上市流通日期。

⁴ 在2001年，监管当局出台的政策是国有股以市场价格作为减持的依据。但这种政策受到了市场的强烈抵制，整个市场的股票价格开始大幅度下滑，监管当局随后紧急停止国有股减持的政策。

⁵ 五部委包括：中国证监会、国资委、财政部、中国人民银行和商务部。

⁶ 资料来源：中国股权分置改革专网（<http://finance.sina.com.cn/stock/chinaggzw/index.shtml>）。

⁷ 企业风险有不同的替代指标，Longstaff（1995）在研究流动性受到限制的股票价格确定时，采用的风险替代指标为股票回报率的波动性。根据经典的资本资产定价模型，Beta系数是重要的风险替代变量，由于本文研究的是非流通股的流动性定价问题，为与此研究领域中的文献相对照，我们主要以股票回报率的波动性作为风险的衡量，Beta系数则作为敏感性检验。同样，盈利能力也有不同定义，本文主要以净资产回报率（ROE）作为研究指标，其他指标则作为敏感性分析。

具体而言，本研究的理论贡献主要表现在如下三个方面：第一，Chen and Yuan (2005) 的研究发现，在非流通股的转让过程中，收益信息无法反映到股票的交易价格之中。但在他们的样本期间，非流通股没有流通的预期，而在股权分置改革的过程，由于具有了明确的流通期限，那么流通权定价反映收益信息的方式是否也发生了变化？这就为流通权的实现在不同的预期条件下如何反映会计信息提供了证据。第二，在股权分置的过程中，不同种类的使用者如机构投资者和普通的个人股东是如何使用会计信息的？是否有不同的使用方式？这种使用方式的不同是否会反映在流通权的定价中？这为理解目前资本市场中会计信息的使用提供了证据。第三，Longstaff (1995) 对非流通股的定价进行了开创性的讨论，但是在包括美国在内的发达市场，流通性受到限制的情况只是非常特殊的现象，而在中国的股改中，非流通股取得流通权却是一个普遍的现象。在 Longstaff (1995) 的研究中，股票回报率的波动性是一个重要的基本面信息，那么这个基本面的信息是否在中国的股改过程中体现出来？以何种方式体现出来？本研究可以提供相应的证据。

本文的组织结构如下：第二部分是相关文献的回顾；第三部分提出了本文的研究假说；在第四部分，我们对样本、变量进行了说明，并提供了简单的描述性分析；第五部分我们设计了研究方案并对实证结果加以分析；第六部分是敏感性分析；最后我们给出了本文的结论以及对未来股权分置改革的启示。

二、文献回顾

流通权是否具有价值以及什么因素影响流通权价值⁸是财务学的一个基本课题。理论上，任何资产的价值都等于资产所产生未来现金流量的现值。在不存在税收、交易成本以及流通性限制的情况下，资产可以按照均衡价格立即转化为现金。在存在交易成本的情况下，买方将会以等于交易成本的数额对资产进行折价；同样的道理，投资者也会因为流通性的不同而对流通性受到限制的股票进行折价。这种因为流通性和交易成本所产生的折价表示了投资者不能按照资产均衡价格立即变现所付出的补偿，这种补偿的合理性是显而易见的，因为投资者会由于流通性限制或高昂的交易成本而失去有利的交易时机，降低最佳的资源配置机会以及自由调整资产组合的空间。

国内外很多学者对于这种因为流通性限制所产生的折价进行过研究。Silber (1991) 以美国 1981 到 1988 年 69 家私下转让流通性受到限制的股票为研究样本，发现流通性折价高达 30%。Longstaff (1995) 基于期权定价模

⁸ 流通权价值是指在其他条件相同的情况下，仅因为流通能力的不同而产生的价值差异。流通性越好，价值越高；流通性越差，价值越低（折价越大）。

型，研究了流通性受到限制的股票和国库券的理论折价，他的研究发现股票回报率波动性越高、限售期越长，则折价越大。对于普通股股票而言，如果年股票回报率的波动性为 0.2，限售期为 1 年，理论折价为 11.79%；当限售期延长到 5 年，理论折价则高达 40.98%。

Chen and Xiong (2001) 基于中国资本市场，研究了 2000 年 8 月到 2001 年 7 月 138 家上市公司非流通股私下协议转让和拍卖转让的折价情况。他们发现，相对于同家公司流通股的市场价格，协议转让折价为 85.59%，拍卖转让折价为 77.93%。相对于美国资本市场的流通性折价，中国股票的流通性折价现象更为严重，这可能是由于中国非流通股股票的限售期更为不确定，投资者无法预期所购买的非流通股股票何时才能上市流通。

Chen and Yuan (2005) 考察了从 1998 到 2003 年 376 家中国上市公司非流通股的转让行为，除了发现流通性受到限制股票的折价外，他们的研究还发现涉及政府和关联方的转让影响价格对于公司会计业绩的反映。具体而言，相对于关联方之间的转让，非关联的转让方式可使转让价格更多地反映会计业绩，而涉及政府的转让（国家和国有法人非流通股的转让）则不利于会计业绩反映到转让价格之中。

概而言之，上述研究主要是考察了流通性受到限制股票的折价现象以及影响因素。2005 年的股权分置改革为我们提供了一个研究流通性受到限制股票的特殊环境。在这个过程中，非流通股的流通日期有了明确的规定，使得中国上市公司的非流通股更加趋近于国外的流通性受到限制的股票。无疑，上述研究为我们提供了一定的理论基础，制度性的改变也有助于我们重新考察非流通股的理论以及隐含价值。私下协议和拍卖转让作为非流通股变相互流通的交易方式，是非流通股股东参与股权分置改革、实施流通的机会成本，当然也会影响非流通股股东的送股决策，即对价。折价越高的公司，流通权的价值越大，非流通股股东愿意支付的补偿也就越多，因此对价也就越高。

三、研究假说

基于美国流通性受到限制的股票，Silber (1991) 的研究表明，收益水平越高，折价越小。基于中国非流通股的转让样本，Chen and Xiong (2001) 发现，对于以拍卖方式进行的转让，会计业绩越好，折价越低。同样基于中国非流通股的转让样本，Chen and Yuan (2005) 的研究表明，对于不涉及政府（国家及国有法人非流通股）和关联方的私下协议转让，每股收益的增加会提高转让价格。从上述分析可以看出，盈利能力越高，意味着股票未来的理论价格越高，当前流通股股票价格的理论支撑点也越高，受到股权分置改革的冲击风险越小。流通股股东基于公司价值的基本判断，会在一定程度上降低对价的要求。另一方面，业绩差的公司表明这些公司上市后业绩下滑幅度较大，在此

过程中，投资者的利益受到了严重的损害。流通股股东要求非流通股股东补偿的愿望就会更加强烈。因此，我们提出假说 1a：

假说 1a：在其他条件相同的情况下，公司的盈利能力越高，对价越低。

Sloan (1996) 和 Xie (2001) 的研究发现，相对于应计利润，经营活动产生的现金流量更具持续性。这些文献认为，相对与净收益，经营活动产生的净现金流量作为公司的业绩计量，更为客观。因为在权责发生制体系之下，净收益会受到应计收入、摊销、折旧和存货计价方法的影响，而这些项目的确认会涉及到更多的主观判断。因此，证券分析师更愿意把经营现金流量与净收益联系起来，以此来判断公司的收益质量 (Bernstein, 1993)，也更为关注经营现金流量在财务报表分析中的信息作用。赵宇龙和王志台 (1999) 的研究发现，投资者无法区分收益不同组成部分的含义，存在所谓“功能锁定”的现象，但在他们的研究期间，机构投资者还很有限。最近几年机构投资者 (尤其是证券投资基金) 的大力发展，对信息基本面的分析越来越重视，专业的证券分析师能够解读经营现金流量与应计项目的含义，并以此来判断公司的收益质量，也更为关注经营现金流量在财务报表分析中的信息作用。

基于上述研究，我们提出假说 1b：

假说 1b：在其他条件相同的情况下，收益质量越高，对价越低。

传统的资本资产定价模型表明风险越高，投资者所要求的必要报酬率越高。另外的资本资产定价模型，比如 APT、基于投资、生产和销售的资本资产定价模型，也表达了类似的结论。因此，从流通股股东的角度，对于风险较高的股票，由于受到影响股票价格事件的冲击较大，所以要求的补偿也越高。

基于美国流通性受到限制的股票，Longstaff (1995, 2001, 2005)，Finnerty (2003) 和 Bajaj *et al.* (2003) 发现股票回报的波动性 (股票报酬风险) 越大，折价越高。基于 2000 年 8 月到 2001 年 7 月 138 家中国上市公司非流通股的转让样本，Chen and Xiong (2001) 在他们的单变量分析中也发现股票回报的波动性越大，折价越大，但该变量没有能够进入到他们的多变量回归分析之中。因此，从非流通股股东的角度，对于股票回报波动性较高的股票，由于转让的机会成本较大，他们在股权分置改革中所愿意支付的补偿也就越多。

基于上述研究发现以及对价和折价之间的内在联系，我们提出假说 2：

假说 2：在其他条件相同的情况下，股票回报的波动性越大，对价越高。

机构投资者作为股票市场的信息中介，具有更高和更为专业的分析、解读和加工公司信息的能力，以及更多的信息获取渠道。因此，我们有理由相信机

构投资者持股比例高的公司，具有更为优越的信息环境。因此，机构投资者持股比例越高，公司会计信息反映到股票价格的能力也就越强。与此结论相一致，Utama and Cready (1997) 和 El-Gazzar (1998) 的研究表明，机构持股比例越高，收益公告的市场反应系数越小；Jiambalvo, Rajgopal and Venkatachalam (2001) 发现机构持股比例越高，股票价格反映公司会计信息越及时；Bartov, Randhkrishnan and Krinsky (2000) 则证实拖尾现象 (post-earnings announcement drifts) 与机构投资者的持股比例显著负相关。

基于机构投资者在资本市场中所发挥的作用，联系假说 1a、1b 和假说 2，我们提出如下假说：

假说3：机构投资者持股比例越高的公司，盈利能力、收益质量和风险水平这些基本面的信息反映到对价之中的能力越强。

四、样本说明、变量定义和描述性分析

(一) 样本

根据中国股权分置改革专网，自 2005 年 5 月 9 日（第一批试点股改公司）到 2005 年 11 月 30 日（第十一批全面股改公司）为止共有 299 家公司进入股改程序。⁹ 排除：1) 股改方案被否决的公司；2) 未完成股改进程的公司；3) 缺少股票回报率数据的公司。¹⁰ 最终样本包括 169 家公司，具体样本选择程序见表 1。

表 1 样本选择程序 (2005 年 5 月 9 日至 2005 年 11 月 30 日)

选择步骤	样本
样本期间所有进入股改程序的公司	299
排除股改方案被否决的公司	(5)
排除未完成股改进程的公司	(113)
排除缺少股票回报率的 (2005 年上市的中小板公司)	(12)
最终样本公司	169
其中：试点股改公司	45
全面股改公司	124

⁹ 参见 <http://finance.sina.com.cn/stock/chinaggzw/index.shtml>。

¹⁰ CSMAR 数据库缺少 2005 年以后上市的 12 家中小板公司的月个股回报率 (002039-002050)。

（二）变量定义

1、因变量

对价水平 (DJ) 是非流通股股东为其持有的股票获得上市流通权而向流通股股东支付的综合补偿水平，即每 10 股流通股所获得的由非流通股股东支付的综合补偿数量。¹¹

向流通股股东送股是对价支付的主要形式，除此之外，支付对价的方式还有缩股、权证、派现、认沽权利、单向转增、资产重组、注资等多种形式。我们在计算对价时，将各种对价综合在一起考虑，统一折算成以流通股股东每持有 10 股流通股所获得的由非流通股股东支付的股份数量（关于不同种类的对价方式如何折合为可以比较的综合对价水平，请参见本文的附录 1 和附录 2）。同时，大股东还可能采用其他承诺事项或者延长限售期的方法对流通股股东进行补偿，这些补偿也应当是综合对价的组成，但是由于这些承诺很难采用合理的方法进行折算，我们将其作为控制变量。

2、解释变量

盈利能力指标：本研究采用公司《股权分置改革说明书》公布以前最新的年度净资产收益率 (ROE) 作为盈利能力的指标，同时考虑到投资者可能采用最新的会计信息，我们在敏感性检验中，也采用了另外的指标来计算 ROE （参见敏感性分析）。同时，我们在敏感性检验中也使用总资产回报率 (ROA) 作为盈利能力的替代指标。

盈利质量指标：根据 Sloan (1996) 的研究，盈利质量可从现金流量和应计项目两方面进行分析。在此，我们把 ROE 分为现金流量带来的 ROE 和应计项目带来的 ROE （以下简称“现金流量回报率”和“应计项目回报率”），即将现金流量和应计项目分别除以净资产。

风险指标：根据 Longstaff (1995, 2001, 2005) 的研究，股票回报的波动性是影响流通性受到限制股票折价的主要因素之一。我们在研究中，使用 2004 年度个股月回报率标准差的自然对数作为风险替代指标。同时，我们也对其他的风险替代指标进行了敏感性分析。

¹¹ 对价可以从流通股和非流通股两个角度来考察。从流通股的角度看，是送达率；从非流通股的角度看，是送出率。我们在此从送达率的角度研究，主要理由是：影响送出率的最重要因素为非流通股的比例，即非流通股的比例越高，取得流通权的代价就越高。流通股股东在对价博弈中，是否会要求非流通股比例高的公司支付高的对价？我们在研究中，把非流通股的比例作为控制变量，实质上考虑了非流通股送出率的主要决定因素。

3、控制变量

主要包括公司规模、机构投资者比例、非流通股比例、大股东的限售期和其他承诺事项，以及控股类型和市场类型。这些因素都可能影响对价的确定，理由分述如下：

公司规模：规模越大，信息不对称的程度越低，流通股股东在股改时所付出的信息成本越少，股改后所需的监督成本也越低，因此所要求的对价水平可能越低；对于大公司的非流通股股东而言，由于信息透明度相对较高，采用转让方式的折价较少，Silber (1991) 和 Chen and Xiong (2001) 的研究结果证实了这一点。

机构持股比例：由于机构投资者具有相对专业的信息分析技术、较低的信息处理成本、较多的信息获取渠道，所以机构持股比例较高的公司，信息不对称的程度相对较低。

非流通股比例：非流通股比例越高，股权分置改革实施后非流通股股票转化为流通股股票的潜在数量越多，原有流通股股东受到的冲击越大，因此需要更多的补偿。另外，Silber (1991)、Bajaj *et al.* (2003) 和 Chen and Xiong (2001) 的研究也都发现流通受到限制的股票占总股数的比例越高，转让折价越大，这意味着转让作为股改替代方式的机会成本越高，非流通股股东在股权分置改革中所愿意支付的对价可能越高。

限售期：从流通股股东的角度，限售期越长意味着当前的流通股股票市场受到股权分置改革冲击的滞后性越长，因此在股改过程中其他条件确定的情况下，非流通股的限售期越长，流通股股东所要求的对价也越低；从非流通股股东的角度，限售期越长，意味着非流通股股东将更可能失去有利的交易时机，进而减少自由调整资产组合的空间，因此所愿意支付的对价也就越低。

承诺事项：作为对价的补充性措施可以在一定程度上起到稳定股票市场的作用，因此非流通股股东承诺的事项越多，流通股股东所要求的对价可能也越低；另外，从非流通股股东的角度，承诺事项越多，意味着股权分置改革后为此所付出的机会成本越高，因此所愿意支付的对价可能也越低。

控股类型：在国家控股的上市公司中，董事长只是形式上的法人代表，而不是财富的实际拥有人，因此可能存在代理问题。另外，国家控股和非国家控股的上市公司，在股改过程中，政治压力、申报以及批准程序也有所不同。因此，我们对控股类型加以控制。

市场类型：中小板公司多属高增长性公司，而高增长性公司的一个主要特征是公司的价值主要取决于未来而不是现在。由于高增长性公司的未来价值更容易受到宏观经济及行业因素的影响 (Jin, Zhang and Chen, 2005)，具有更大程度的不确定性，所以在其他条件确定的情况下，流通股股东对中小板公司所要求的对价可能较高。

表 2 列出了变量的简单释义。

对价水平、承诺事项和限售期等数据来自上市公司的《股权分置改革说明书（全文）》、《股权分置改革说明书（全文修订稿）》和《股权分置改革方案实施公告》。计算净资产收益率、经营现金流量和应计利润的历史财务数据，以及计算收益波动性的股票交易数据来自 CSMAR 数据库。

表 2 变量释义

变量类型	变量	符号	简单释义
因变量	对价	<i>DJ</i>	流通股股东每持有 10 股流通股所获得的非流通股股东支付的股份数量。
解释变量	净资产收益率	<i>ROE</i>	股权分置改革说明书（或修订稿）公布以前的年度净利润除以所有者权益的账面价值。
	现金流量回报率	<i>CF</i>	股权分置改革说明书（或修订稿）公布以前的年度经营现金流量除以所有者权益的账面价值。
	应计项目回报率	<i>ACCR</i>	股权分置改革说明书（或修订稿）公布以前的年度净利润与经营现金流量之差除以所有者权益的账面价值。
	股票回报波动性	<i>VOLA</i>	2004 年度个股月回报率标准差的自然对数。 ¹²
	<i>BETA</i> 系数	<i>BETA</i>	基于股票周报酬率和流通市值加权的市场报酬所计算的 Beta 系数。
控制变量	公司规模	<i>SIZE</i>	股权分置改革说明书（或修订稿）公布以前最新的财务报表所列示的总资产的自然对数。
	非流通股比例（%）	<i>NPROP</i>	股权分置改革说明书（或修订稿）公布以前最新的非流通股股数占总股数的比例。
	机构持股比例（%）	<i>IS</i>	股权分置改革说明书（或修订稿）公布以前最新的十大流通股股东中机构持股数占流通股股数的比例。
	限售期（年）	<i>TIME</i>	由法定限售期（一年）和大股东承诺的附加限售期组成。
	承诺事项	<i>MEAN</i>	非流通股股东在股改方案中做出承诺事项的多少。
	控股类型	<i>OWN</i>	虚拟变量，如果该公司属于国家控股（国家或国有法人）则为 1，否则计为零。
	市场类型	<i>MARKET</i>	虚拟变量，如果该公司属于主板公司（深市或沪市）则为 1，否则计为零。

¹² 使用个股日回报率的标准差作为股票回报率波动性的度量，不改变本文的结论。

(三) 描述性分析

表 3 提供了研究样本的描述性统计量。首先，非流通股股东向流通股股东支付对价的均值为 3.31（中值为 3.30），最高对价为 5，最低为 1，标准差为 0.64，这表明对价在我们的研究样本中表现出较大的差异，随后我们会考察具体哪些因素有助于解释这些差异。其次，主要的解释变量中，净资产收益率的均值和中值分别为 15.10% 和 13.32%；在收益的构成中，应计项目回报率的均值（中值）为 -0.62（-2.80）；现金流量回报率的均值（中值）为 15.72（15.09）；这说明从总体上来看，在公司收益的构成中，现金占主要的比重，具有较高的盈利质量。

另外，我们也注意到控制变量的一些特征，机构持股比例具有显著的差异，从最低的 0 到最高的 63.54%。超过一半的公司限售期大于 2 年，最长为 6 年；25% 的公司做出 1 项以上的承诺事项，最多的高达 4 项，显示这些公司的非流通股股东为股改方案的通过，对方案做了复杂的设计。数据也显示，股改公司的规模和非流通比例也有显著的差异，这说明股改公司具有比较好的代表性。最后，两个虚拟控制变量的描述性统计量表明，169 家样本公司有 43% 的公司属于国家控制（国家和国有法人），22% 的公司属于 2004 年以后在深圳上市的中小板公司。

表 3 描述性统计量

变量	观测值	均值	中值	标准差	最小值	第一	第三	最大值
<i>DJ</i>	169	3.31	3.30	0.64	1	3	3.60	5
<i>ROE</i>	169	15.10	13.32	11.25	-39.40	8.58	19.75	72.62
<i>CF</i>	169	15.72	15.09	30.50	-91.67	1.72	28.44	99.33
<i>ACCR</i>	169	-0.62	-2.80	29.36	-88.42	-12.12	8.89	127.98
<i>VOLA</i>	169	2.25	2.25	0.37	1.11	2	2.47	3.32
<i>BETA</i>	169	1.14	1.09	0.38	0.18	0.91	1.35	2.62
<i>SIZE</i>	169	12.07	11.96	1.11	9.16	11.24	12.73	15.74
<i>IS</i>	169	13.01	6.96	13.91	0	1.22	22.34	63.54
<i>NPROP</i>	169	65.89	67.92	10.36	38.61	60	73.33	94.67
<i>TIME</i>	169	2.30	2	1.16	1	1	3	6
<i>MEAN</i>	169	0.86	1	0.97	0	0	1	4
<i>OWN</i>	169	0.43	0	0.50	0	0	1	1
<i>MARKET</i>	169	0.78	1	0.42	0	1	1	1

(四) 变量之间的相互关系分析

我们在表 4 中报告了自变量之间的相互关系。通过自变量之间的相互关系分析，一方面有助于我们更好地理解单变量分析中的实证结果；另一方面也

表 4 变量之间的皮尔逊相关关系分析

	ROE	ACCR	CF	VOLA	BETA	SIZE	IS	NPROP	TIME	MEAN	OWN	MARKET
DJ	-0.21***	0.30***	-0.36***	0.15**	0.23***	-0.20***	-0.21***	0.39***	-0.20***	-0.18**	-0.10	-0.13*
ROE		0.09	0.28***	-0.07	-0.24***	0.05	0.34***	0.08	0.16**	-0.01	-0.02	-0.04
ACCR			-0.93***	0.12	0.29***	-0.22***	0	0.16**	-0.002	-0.01	-0.20**	-0.29***
CF				-0.15*	-0.36***	0.24***	0.13*	-0.13*	0.06	0.006	0.18**	0.26***
VOLA					0.56***	-0.33***	-0.13*	0.02	0.04	-0.10	-0.22***	-0.33***
BETA						-0.46***	-0.33***	0.07	0.02	-0.10	-0.29***	-0.58***
SIZE							0.12	-0.02	-0.01	0.11	0.41***	0.54***
IS								-0.01	0.12	0.08	0.03	-0.001
NPROP									-0.25***	-0.08	-0.04	-0.19**
TIME										0.01	-0.12	-0.03
MEAN											-0.07	0.05
MARKET												0.30***

注：* 表示通过 10% 显著性水平检验（双尾检验）；** 表示通过 5% 显著性水平检验（双尾检验）；*** 表示通过 1% 显著性水平检验（双尾检验）。

可以避免在多变量回归设计中，因为某些自变量之间的高度相关而产生的多重共线性。

根据自变量之间的皮尔逊相关系数，我们发现：对价与净资产收益率和现金流量回报率在1%的显著水平上负相关，净资产回报率与机构持股比例显著正相关。应计项目回报率与现金流量回报率高度负相关，相关系数为-0.93。因此，为了避免多重共线性，我们在多变量回归分析中将应计项目回报率与现金流量回报率置于不同的模型之中分别予以考察。现金流量回报率与公司规模、主板公司显著正相关；收益的波动性与公司规模、国家控股、主板公司显著负相关；公司规模与国家控股、主板公司显著正相关；非流通股比例与限售期显著负相关；国家控股则与主板公司显著正相关。

五、模型和实证结果

(一) 对价与盈利、风险关系的分析

为了检验假说 1a、1b 和假说 2，我们设计了如下回归模型：

$$DJ_i = \alpha_0 + \alpha_1 * ROE_i + \alpha_2 * VOLA + \sum_{j=3}^n \alpha_j * control_j + \varepsilon_i \quad (1)$$

$$DJ_i = \beta_0 + \beta_1 * ACCR_i + \beta_2 * VOLA + \sum_{j=3}^n \beta_j * control_j + \varepsilon_i \quad (2)$$

$$DJ_i = \gamma_0 + \gamma_1 * CF_i + \gamma_2 * VOLA + \sum_{j=3}^n \gamma_j * control_j + \varepsilon_i \quad (3)$$

$$DJ_i = \lambda_0 + \lambda_{11} * ACCR_i + \lambda_{12} * CF_i + \lambda_2 * VOLA + \sum_{j=3}^n \lambda_j * control_j + \varepsilon_i \quad (4)$$

根据假说 1a、1b 和假说 2，我们期望 α_1 (γ_1 、 λ_{12}) < 0 ， α_2 (β_2 、 γ_2 、 λ_2) > 0 。

表 5 提供了影响对价的多因素分析结果。¹³ 从盈利能力看，净资产收益率 (ROE) 的系数为 -0.01，T 值为 -2.47，在 1% 水平下显著为负。说明盈利能力越高，对价越低，公司的盈利能力的确反映到对价的确定之中。这和我们的假说 1a 相符。从收益质量上来看，现金流量回报率 (CF) 的系数为 -0.01，而应计项目回报率 (ACCR) 的系数则为 0.01，二者均在 1% 水平下显著，表明在收益的构成中，现金的水平越高，对价越低；而应计项目的水平越高，对价越低。根据 Sloan (1996) 的研究结果：收益中经营现金流量越

¹³ 我们对自变量进行了多重共线性检验，通膨因子 (VIF) 显示自变量之间不存在共线性问题。

高，应计项目越低，收益持续性越大。而收益持续性越大，由流量资产而产生的公司未来价值也就越高，流通股股东基于对公司未来价值的基本判断，会在一定程度上降低对价的要求，非流通股股东支付的对价也因此可以相对低一些。这和我们的假说 1b 相符。

表 5 影响对价的多因素分析

	模型 1		模型 2		模型 3		模型 4	
	系数	T 值	系数	T 值	系数	T 值	系数	T 值
<i>INTERCEPT</i>	2.88***	4.01	2.83***	3.99	2.82***	4.05	2.83***	4.07
<i>ROE</i>	-0.01***	-2.47						
<i>ACCR</i>			0.01***	3.25			-0.01	-1.45
<i>CF</i>					-0.01***	-4.10	-0.01***	-2.83
<i>VOLA</i>	0.12*	1.95	0.13**	2.03	0.12***	2.97	0.11*	1.91
<i>SIZE</i>	-0.09*	-1.73	-0.08	-1.62	-0.08	-1.55	-0.08	-1.54
<i>IS</i>	-0.004	-1.33	-0.01***	-2.31	-0.01*	-1.86	-0.004	-1.33
<i>NPROP</i>	0.02***	5.26	0.02***	4.65	0.02***	4.84	0.02***	5.02
<i>TIME</i>	-0.04	-1.04	-0.06	-1.48	-0.05	-1.28	-0.04	-1.06
<i>MEAN</i>	-0.08*	-1.81	-0.08*	-1.77	-0.08*	-1.87	-0.09*	-1.93
<i>OWN</i>	-0.06	-0.58	-0.02	-0.22	-0.02	-0.21	-0.03	-0.28
<i>MARKET</i>	0.09	0.66	0.16	1.25	0.17	1.33	0.15	1.22
样本数量	169		169		169		169	
<i>Adj-R²</i>	24.1%		26.1%		28.7%		29.2%	

注：* 表示通过 10% 显著性水平检验（双尾检验）；** 表示通过 5% 显著性水平检验（双尾检验）；*** 表示通过 1% 显著性水平检验（双尾检验）。

在四个回归模型中，股票回报波动性（*VOLA*）均显著为正，表明股票回报波动性越大，对价越高。股票回报的波动性越大，意味着流通股股票的风险越高，非流通股股票（流通限制股票）的转让折价越大（Longstaff, 1995, 2001, 2005; Chen and Xiong, 2001），因此，非流通股股东所愿意支付的对价也越高。这和我们的假说 2 一致。

另外，控制变量中只有非流通股比例和承诺事项在四个回归模型中均显著。在四个模型中，非流通股比例（*NPROP*）均为 0.02，都在 1% 水平下显著为正，表明非流通股比例越高，股权分置改革实施后非流通股股票转化为流通股股票的潜在数量越多，原有流通股股东受到的冲击越大，因此需要更多的补偿。另外，Silber（1991）和 Chen and Xiong（2001）的研究也发现流通性受到限制的股票占总股数的比例越高，转让折价越大，这意味着转让作为股改替代方式的机会成本越高，非流通股股东在股权分置改革中所愿意支付的对

价也就越高。承诺事项 (*MEAN*) 在前三个模型中的系数为 -0.08 ，在第四个模型中的系数为 -0.09 ，均在 10% 显著性水平下为负，表明如果非流通股股东通过承诺事项付出成本，其支付的对价就比较低。机构持股比例 (*IS*) 在模型 2 和 3 中显著为负，其他两个回归中符号也为负，但不显著。显示机构投资者为主的公司要求的对价比较低。¹⁴

其他的控制变量，比如公司规模、限售期、控股类型、市场类型在多变量分析中均不显著。

(二) 机构投资者以及对价与盈利、风险关系的分析

为检验假说 3 (即机构投资者的广泛参与是否会使更多的相关信息反映到对价之中)，我们首先以机构投资者持股比例 5% 作为切分点，¹⁵ 构造 *HIS* 虚拟变量 ($IS \geq 5\%$)，然后运行如下回归。

$$DJ_i = \alpha_{01} + \alpha_{02} * HIS_i + \alpha_{11} * LIS_ROE_i + \alpha_{12} * HIS_ROE_i + \alpha_{21} * LIS_VOLA_i + \alpha_{22} * HIS_VOLA_i + \sum_{j=3}^n \alpha_j * control_j + \varepsilon_i \quad (5)$$

$$DJ_i = \beta_{01} + \beta_{02} * HIS_i + \beta_{11} * LIS_ACCR_i + \beta_{12} * HIS_ACCR_i + \beta_{21} * LIS_VOLA_i + \beta_{22} * HIS_VOLA_i + \sum_{j=3}^n \beta_j * control_j + \varepsilon_i \quad (6)$$

$$DJ_i = \gamma_{01} + \gamma_{02} * HIS_i + \gamma_{11} * LIS_CF_i + \gamma_{12} * HIS_CF_i + \gamma_{21} * LIS_VOLA_i + \gamma_{22} * HIS_VOLA_i + \sum_{j=3}^n \gamma_j * control_j + \varepsilon_i \quad (7)$$

$$DJ_i = \lambda_{01} + \lambda_{02} * HIS_i + \lambda_{111} * LIS_ACCR_i + \lambda_{112} * HIS_ACCR_i + \lambda_{121} * LIS_CF_i + \lambda_{122} * HIS_CF_i + \lambda_{21} * LIS_VOLA_i + \lambda_{22} * HIS_VOLA_i + \sum_{j=3}^n \lambda_j * control_j + \varepsilon_i \quad (8)$$

其中， $HIS_VARIABLE_i$ 为 *HIS* 和相应变量的交叉变量； $LIS_VARIABLE_i$ 为 $(1 - HIS)$ 和相应变量的交叉变量。

根据假说 3，机构投资者持股比例越高的公司，盈利能力、收益质量和风险水平反映到对价之中的能力越强。因此我们期望： α_{11} (γ_{11} 、 λ_{121}) 和

¹⁴ 为什么机构投资者持股比例越高，要求的对价越低，我们将在后续的研究中进行讨论。

¹⁵ 在敏感性检验部分，我们将考察采用其他的替代变量是否会影响本文的结果。

α_{12} (β_{21} 、 γ_{21} 、 λ_{21}) 不显著区别于零；而 α_{12} (γ_{12} 、 λ_{122}) 和 α_{22} (β_{22} 、 γ_{22} 、 λ_{22}) 显著异于零。

表 6 基于机构投资者的参与程度，报告了影响对价的多因素分析结果。结果显示：机构投资者虚拟变量 (*HIS*) 在四个回归中均在 1% 显著水平下为负，显示机构投资者持股要求的对价比较低。在模型 5 中，机构投资者虚拟变量和净资产回报率的交叉项 (*HIS_ROE*) 的系数为 -0.013，在 5% 显著水平下为负；而非机构投资者虚拟变量和净资产回报率的交叉项 (*LIS_ROE*) 的系数为 -0.009，不显著。这个结果就表明，对于机构投资者参与程度较高的公司，净资产收益率越高，对价越低，盈利能力在对价中的反映主要是机构投资者的参与导致。

在模型 6 中，机构投资者虚拟变量和应计项目回报率的交叉项 (*HIS_ACCR*) 的系数为 0.007，在 1% 显著水平下为正；而非机构投资者虚拟变量和现金流量回报率的交叉项 (*HIS_CF*) 的系数虽然为正，但不显著。在模型 7 中，机构投资者虚拟变量和现金流量回报率的交叉项 (*HIS_CF*) 的系数为 -0.007，在 1% 显著水平下为负；而非机构投资者虚拟变量和现金流量回报率的交叉项 (*HIS_CF*) 的系数虽然为负，但不显著。模型 6 和 7 的结果显示，只有机构投资者能够看穿盈利的质量。现金流量回报率越低，对价越高。应计项目回报率越高，支付的对价越高。

机构投资者虚拟变量和股票回报波动性的交叉项 (*HIS_VOLA*) 的系数均显著为正，而非机构投资者虚拟变量和股票回报波动性的交叉项 (*LIS_VOLA*) 的系数均显著为负，说明股票回报波动性越大，对价越高。这表明，表 6 中基本因素在对价中的反映主要是由于机构投资者的参与所导致。对于机构投资者参与程度较低的公司，主要解释变量(净资产收益率、应计项目回报率、现金流量回报率和股票回报波动性)均不显著。这说明，由于投资的群体主要是普通的个体投资者，影响股票价格的基本因素没有反映到对价之中。

表 6 的控制变量和表 5 一致。概而言之，表 6 的结果与我们的假说 3 一致，表明机构投资者的广泛参与能够使得净资产收益率、收益质量以及股票回报的波动性更多地反映到对价之中。

六、敏感性分析

为了进一步证实结果的可靠性，我们尝试做了如下敏感性检验：

1、考察不同的风险衡量指标是否会对结论产生影响。我们使用了如下三种风险的替代指标：1) 总市值加权的市场回报率所计算的 Beta 系数；2) 流通市值加权的市场报酬所计算的 Beta 系数；3) 使用个股日回报率的标准差作为收益波动性的度量。这些检验表明结论不变。

2、考察不同的盈利能力指标是否会对结论产生影响。我们采用了如下两

表 6 影响对价的多因素分析——机构投资者相对非机构投资者

	模型 5		模型 6		模型 7		模型 8	
	系数	T 值	系数	T 值	系数	T 值	系数	T 值
INTERCEPT	3.966***	4.93	3.770***	4.93	3.627***	4.83	3.876***	4.98
HIS	-1.899***	-3.31	-1.701***	-3.05	-1.590***	-2.88	-1.669***	-3.00
LIS_ROE	-0.009	-1.63						
HIS_ROE	-0.013**	-2.09						
LIS_ACCR			0.002	0.73				
HIS_ACCR			0.007***	3.44				
LIS_CF					-0.003	-1.50	-0.010	-1.62
HIS_CF					-0.007***	-3.99	-0.013**	-2.19
LIS_VOLA	-0.364	-1.64	-0.316	-1.62	-0.313	-1.64	-0.332	-1.54
HIS_VOLA	0.387***	2.56	0.339**	2.25	0.333**	2.26	0.323***	2.19
SIZE	-0.075	-1.48	-0.059	-1.19	-0.052	-1.07	-0.063	-1.27
NPROP	0.023***	5.18	0.019***	4.28	0.020***	4.65	0.020***	4.61
TIME	-0.045	-1.16	-0.065*	-1.74	-0.053	-1.46	-0.047	-1.26
MEAN	-0.095***	-2.11	-0.086*	-1.93	-0.090**	-2.07	-0.094**	-2.15
OWN	-0.030	-0.31	0.009	0.09	0.011	0.11	-0.001	-0.01
MARKET	0.090	0.71	0.141	1.12	0.146	1.18	0.150	1.21
样本数量	169	169	169	169	169	169	169	169
Adj-R ²	27.6%	29.8%	32%	32.7%				

注：* 表示通过 10% 显著性水平检验（双尾检验）；** 表示通过 5% 显著性水平检验（双尾检验）；*** 表示通过 1% 显著性水平检验（双尾检验）。HIS 为虚拟变量，如果机构持股比例大于或等于 5%，它等于 1，否则等于 0；HIS_VARIABLE_{*i*} 为 HIS 和相应变量的交叉变量；LIS_VARIABLE_{*i*} 为 (1-HIS) 和相应变量的交叉变量。

种替代指标：1) 考虑到投资者在做出决策时也许更为关注最新的会计业绩，我们使用年度化¹⁶的净资产收益率、应计项目回报率、现金流量回报率来代替年度净资产收益率、应计项目回报率、现金流量回报率；2) 采用总资产回报率 (ROA) 作为盈利能力的替代指标。发现这些检验对本文的研究结论没有影响。

3、考察机构投资者的不同定义是否会对结论产生影响。我们采用了如下两种方法：1) 对机构投资者持股比例进行排序后，把样本分成相等的三组，视第一组为机构投资者参与程度较低的样本，然后合并第二和第三组作为机构投资者参与程度较高的样本；2) 以机构持股比例低于 5% 的数值作为划分的依据。这些检验不改变本研究的主要结论。

4、考察具体的承诺事项是否会对结论产生影响。我们根据上市公司股改过程中提供的具体承诺进行细分，检验表明不影响本文的结论。

5、如果仅选取以送股形式为对价的公司作为样本，不改变本文的结论。

七、结论及启示

基于 2005 年 5 月 9 日到 2005 年 11 月 30 日完成股改程序的 169 家中国上市公司，我们研究了影响对价的基本因素，并考察了机构投资者在其中所起的作用。根据实证研究的发现，我们得出主要结论：(1) 上市公司的盈利能力 (净资产收益率) 越高，流通股股东得到的对价越低；收益质量 (现金流量回报率) 越高，流通股股东得到的对价越低。(2) 股票回报波动性越大，对价越高。(3) 机构投资者参与程度越高，净资产收益率、收益质量、股票回报波动性反映到对价之中的能力越强。另外，我们还发现，公司规模、非流通股比例、限售期与承诺事项的多少，也会影响对价。

本文的研究对中国上市公司进一步的股权分置改革具有如下启示意义：

(1) 如果对价不反映企业的盈利能力、盈利质量和风险等基本因素，对价就更可能被扭曲。机构投资者为主的公司，流通股股东和非流通股股东的博弈考虑了公司信息的基本面；而在非机构投资者为主的公司，博弈双方脱离了公司基本面。

(2) 从流通股股东的角度，有助于他们更好地根据公司的基本信息以及股改方案来判断对价的合理性，从而维护自身的利益；另一方面，也有助于他们

¹⁶ 如果我们依据的是第一季度的会计信息，我们定义：年度化的净资产收益率 = (净利润 * 4) / 净资产；如果依据的是中报的会计信息，年度化的净资产收益率 = (净利润 * 2) / 净资产；如果依据的是第三季度的会计信息，年度化的净资产收益率 = (净利润 * 4/3) / 净资产，对于年度化的应计利润与经营现金流量，方法程序相同。

更好地理解什么信息才是影响对价的主要因素，从而在繁多的信息中把握关键。

(3) 从非流通股股东的角度，有助于他们根据公司的经营状况、收益质量、股权结构等基本信息以及流通股股票的风险情况，设计合理的对价方案，在维护自身利益不受损害的前提下，顺利通过股改方案。

(4) 对于相关的政府部门而言，了解哪些因素影响对价，可以帮助他们出台有针对性的管理办法和指导意见，从而维护改革的顺利进行。

(5) Chen and Yuan (2005) 的研究发现，通过协议的方式进行私下转让，由于收益与价格的脱节，转让价格主要反映每股净资产。而我们的研究表明，通过股改的方式实施全流通，对价则主要反映净资产收益率以及收益质量，这意味着股权分置改革的确有利于证券市场的价格发现功能。因此，从公司治理的角度，股改方案的实施有助于非流通股股东财富最大化的标准从静态的净资产，转向动态的盈利能力，这一标准的转变，无疑将会推动非流通股股东与公司总体目标的一致性。

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附录 1 对价水平确定的解释说明

1. 单一方案的计算值：

(1) 直接送股：公布值和计算值均为每 10 股支付对价股数。

(2) 间接送股（上市公司送转）：按送转后股本计算的每 10 股支付对价股数。

(3) 单向转增：折算为向全体股东转增模式。

向全体股东转增比例 = 转增股份总数 / 转增前总股本。

折算送股对价（计算值）= 非流通股总数 * 向全体股东转增比例 / 按新的转增比转增后流通股本。

(4) 派现：每 10 股支付现金数（对价）/ 获准公告日前一交易日收盘价。

(5) 缩股：缩股数 * 10 / 缩股后总股本。

(6) 权证：每份权证理论价格 * 份数 / 获准公告日前一交易日收盘价。

(7) 注资：每 10 股注入现金 / 获准公告日前一交易日收盘价。

(8) 资产重组：

a. 注入资产（包括现金和股权）、资产置换（相当于直接注入资产）：
注入资产价值 * 10 / (获准公告日前一交易日总股本 * 获准公告日前一交易日收盘价)；

b. 债务豁免（包括非流通股股东以股份换取债权人豁免债务，不包括以股抵债）：
豁免债务 * 10 / (获准公告日前一交易日总股本 * 获准公告日前一交易日收盘价)；

c. 非流通股股东现金收购债权：每股净资产预期损失减少数 * 10 / 获准公告日前一交易日收盘价。

2. 组合方案算法：

(1) 将各种类型单独计算，结果合并。

(2) 方案为上市公司送转、派现，派现部分计算方法为：每 10 股支付现金数(对价)/ 获准公告日前一交易日收盘价（算法同没有送转）。

(3) 方案为上市公司送转、权证，权证部分计算方法为：每份权证理论价格 * 份数 / 获准公告日前一交易日收盘价（算法同没有送转）。

(4) 凡方案只涉及股份的，包括直接送股、间接送股、定向转增、缩股、送股和缩股，都可以用同一种方法：（实施后流通股股东持股比例 - 实施前流通股股东持股比例）* 10 / 实施前流通股股东持股比例。

附录 2 几种典型对价的折算

G 农产品 (000061) 的对价方案：在实施之日起的第 12 个月的最后 5 个交易日，所有流通股股东有权以 4.25 元 / 股的价格将持有的农产品流通股股票出售给深圳市国资委。显然，这是一份存续期为 360 天（一年按 365 天计）、执行价格为 4.25 元的欧式认沽权证。基于无风险收益率（中国人民银行网站公布的金融机构一年期定期存款利率 2.25%），股改公告前的股票收盘价（3.4 元），以及股票的年度收益波动率（0.2946），我们采用国际通用的 Black-Scholes 期权定价模型计算这份认沽权证的价格为 0.916 元，因此农产品的对价水平为 2.69 ($0.916 * 10 / 3.4$)。

G 敖东 (000623) 的对价方案：非流通股股东按照 1:0.6074 的比例缩股，同时，公司向全体股东派现。非流通股股东将其应得股利全部支付给流通股股东，流通股股东实际现金所得为每 10 股 4 元（税前）。基于股改公告前 G 敖东最新的流通股比例（0.5355），我们测算出非流通股股东按 1:0.6074 的比例缩股，相当于对价水平为 2.23。假设 G 敖东共有 100 股股票，缩股前流通股比例为 0.5355，也就是说，该公司有 53.55 股流通股，46.45 股非流通股。如果非流通股股东按 1:0.6074 的比例缩股，那么缩股后公司有 53.55 股流通股，28.21 ($46.45 * 0.6074$) 股非流通股，缩股后流通股比例变为 0.6549 ($53.55 / (53.55 + 28.21)$)。因此每 10 股流通股股东所获得的对价水平为 2.23 ($(0.6549 - 0.5355) * 10 / 0.5355$)。基于股改公告前的股票收盘价（5.9 元）和缩股对应的对价水平，每 10 股流通股股东实得现金 4 元，相当于对价水平为 0.66 ($4 * (1 - 0.2) * 1.223 / 5.9$ ，其中 0.2 为现金红利所得税税率)。因此，G 敖东通过缩股以及派现相当的对价水平为 2.89 ($2.23 + 0.66$)。

G 中富 (000659) 的对价方案：流通股股东每 10 股可获 2.5 股的股份对价以及 0.772 元的现金对价。基于股改公告前的股票收盘价（3.39 元）和非流通股股东向每 10 股流通股股东所送的股份，我们测算出 G 中富的对价水平为 2.73 ($2.5 + 0.772 * 0.8 * 1.25 / 3.39$)。

G 武钢 (600005) 的对价方案：股权登记日登记在册的流通股股东每持有 10 股流通股将获得武钢集团支付的 2.5 股股份、2.5 份认沽权证和 2.5 份认购权证，其中每份认沽权证可以 3.13 元的价格，向武钢集团出售 1 股股份。每份认购权证可以 2.90 元的价格，向武钢集团认购 1 股股份。上述权证均为欧式行权，存续期 12 个月。基于无风险收益率 2.25%，执行价 3.13 元，股改公告前的股票收盘价 3.45 元，以及股票的年度收益波动率 0.2397，我们测算出每份认沽权证的价格为 0.153 元；基于执行价 2.9 元，我们测算出每份认购权证的价格为 0.701 元。根据非流通股股东向每 10 股流通股股东所送股份、股改公告前的股票收盘价，以及认沽、认购权证的数量，我们最后折算出 G 武钢的对价水平为 3.27 ($0.153 * 2.5 * 1.25 / 3.45 + 0.701 * 2.5 * 1.25 / 3.45 + 2.5$)。

DOES THE COMPENSATION RATIO REFLECT EARNINGS AND RISKS UNDER THE SPLIT SHARE STRUCTURE REFORM?*

Qinglu Jin¹ and Hongqi Yuan²

ABSTRACT

This paper investigates the determinants of compensation ratio under the Split Share Structure Reform in China, and examines whether the participation of institutional investors influences the impounding of firm-specific fundamental information into the compensation ratio. We find that the compensation ratio does indeed reflect the information on earnings and volatility of stock returns. In particular, higher returns on equity and earnings quality lead to a lower compensation ratio, while a higher volatility of stock returns leads to a higher compensation ratio. We also show that the participation of institutional investors increases the effectiveness of returns on equity, earnings quality, and volatility of stock returns in explaining the compensation ratio.

Keywords: Split Share Structure Reform, Compensation Ratio, Returns on Equity, Volatility of Stock Returns

I. INTRODUCTION

The differentiation between untradable and tradable shares is a unique feature in the Chinese capital market,³ and has led to many serious problems. Because the supply

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³ The marketability of a security may be restricted in some Western capital markets. For example, stocks issued by firms under SEC Rule 144 (letter stocks) cannot be sold within the two years after they are acquired. But these restricted stocks are different from the untradable stocks in China; in particular, there are no definite dates for floating for these untradable shares.

of tradable shares is limited, this differentiation affects the stability and price discovery function of the capital market. In addition, since stock prices do not reward good performance while penalizing poor performance, this differentiation makes the mechanism of corporate governance incapable of forming a mutual basis for the interests of both holders of tradable shares and holders of untradable shares. Holders of untradable shares, such as government agencies, state-owned enterprises, or private entities, face an additional problem in that they cannot cash in their shareholdings through the open market. To raise funds for the state pension system, the State Council of China announced on 13 June 2001 a plan⁴ to sell state shares on the open market. Although this was to involve only a gradual disposal of state shares on the market, it triggered investors' fears of dilution of the market value of tradable shares. During the year following this announcement, the stock market fell by almost 30 per cent, and in June 2002 the government was forced to call off the plan to sell state shares; it also pledged not to issue any alternative plans. In view of the failure of the plan to sell down state shares, the Chinese government determined to resolve the problems caused by the differentiation between tradable and untradable shares. After almost three years of deliberation and consultation, the China Securities Regulatory Commission (CSRC) promulgated the "Circular on Issues Relating to the Pilot Reform of Split Share Structure in Listed Companies" on 29 April 2005. The Circular provides a mechanism for holders of untradable shares and those of tradable shares to decide between themselves on an acceptable compensation that the former must pay to the latter before untradable shares can become tradable. According to the Circular, the CSRC identified two batches of pilot companies on 9 May 2005 and 20 June 2005, respectively. Upon completion of the pilot reform, five ministries and commissions⁵ jointly promulgated the "Guidance Opinions on the Split Share Structure Reform in Listed Companies" on 23 August 2005. Afterwards, the CSRC published the "Administrative Measures on the Split Share Structure Reform in Listed Companies" on 4 September 2005. The Guidance and Measures kicked off the all-round reform of the Split Share Structure. As of 30 November 2005, 299 companies have published their reform projects, of which 181 have implemented their plans.⁶

The key to the Split Share Structure Reform (hereinafter referred to as the "Reform") is the definition of the compensation ratio at which holders of untradable

⁴ According to this plan, whenever a firm issues new or additional shares on the market, the State can at the same time sell shares that amount to 10 per cent of the proceeds raised. The selling price of the state shares is the same as that of tradable shares, and the shares sold become tradable. The proceeds from selling of the state shares will then be transferred to the national social welfare and pension funds.

⁵ The five ministries and commissions include the China Securities Regulatory Commission (CSRC), the State-Owned Assets Supervision and Administration Commission of the State Council, the Ministry of Finance, the People's Bank of China, and the Ministry of Commerce.

⁶ Data are sourced from the website for the Chinese Split Share Structure Reform (<http://finance.sina.com.cn/stock/chinaggzw/index.shtml>).

shares pay those of tradable shares in exchange for trading rights. Whether or not the compensation ratio is reasonable directly influences the interests of both types of shareholders, and therefore determines whether the reform plan can be approved. The Reform is a game among various parties. The compensation ratio may be influenced by many factors, one of which is the concern about whether there is any benchmark for the game. Our basic questions are, therefore, whether the fundamental information about earnings and volatility has been impounded into the compensation ratio,⁷ and whether the participation of institutional investors influences the impounding of firm-specific fundamental information into the compensation ratio. Examination of these issues not only has implications for the implementation of the Reform, but also contributes to the literature on the asset-pricing effects of illiquidity.

In particular, this paper makes the following contributions to studies about asset pricing and illiquidity. First, Chen and Yuan (2005) find that transfer prices of untradable shares reflect in general only the value of a firm's existing assets, not the value of growth opportunities that depend on current and future earnings. However, the untradable shares are not expected to be tradable during their sample period. With the Reform, the floating date for untradable shares is clearly defined, and hence the question is whether changes in the institutional setting influence the impounding of fundamental information into stock prices. Our results provide empirical evidence on how trading rights reflect fundamental accounting information under different institutional conditions. Second, with the Reform, how do investors, such as the institutional investors and individual shareholders, use the accounting information? This paper provides empirical evidence to better understand the usage of accounting information in capital markets. Finally, Longstaff (1955) examines the impact of marketability on security prices. Untradable restricted stocks are rarely found in developed capital markets, but they are common in the Chinese market due to the Split Share Structure. Longstaff (1955) uses volatility of stock returns as one of his fundamental measures; our results also provide evidence as to whether and how this fundamental measure is reflected in the Reform.

The remainder of the paper is organised as follows. The next section reviews some selective literature. Section III presents the hypotheses. Section IV describes the sample and variables, and the simple descriptive analysis. Section V presents the empirical analysis, including research methodology and empirical results. Section VI explains the sensitive analysis, and Section VII concludes the paper with a discussion of the implications of our findings.

⁷ There are different proxies for measuring risks. Longstaff (1955) uses the volatility of stock returns as the proxy for risk. Based on the classical CAPM model, Beta coefficient is an important proxy for risk. Since this paper focuses on the pricing of restricted stocks, we use volatility of stock returns as the proxy for risk and check Beta in the robustness test. There are also different definitions of profitability. We use ROE as the main measure and such other measures as ROA for the robustness check.

II. LITERATURE REVIEW

The study of finance basically focuses on, among other things, the effect of marketability on security prices and the factors influencing illiquidity discounts.⁸ In theory, the value of an asset equates to the present value of future cash flows to be generated. Under a setting without tax, transaction costs, and marketability restrictions, an asset can be translated into cash immediately at the equilibrium price. Taking into account the transaction costs, the buyer will give a discount on asset prices based on these transaction costs. Similarly, investors will give an illiquidity discount due to marketability restrictions. This discount is the compensation for marketability restrictions and transaction costs. The rationale behind the compensation is reasonable, because the lack of marketability and high transaction costs may restrict the investors' ability to time the market, thereby influencing their ability to best allocate resources and adjust their asset portfolios.

The impact of transfer and other marketability restrictions on stock prices continues to be of both theoretical and practical interest. Based on 69 firms offering private placements from 1981 to 1988, Silber (1991) finds that Rule 144 letter stocks that have not been for resale for two years have an average price discount of more than 30 per cent, relative to the otherwise identical freely traded common shares of the same company. Based on the option pricing model, Longstaff (1995) examines the impact of marketability on the illiquidity discounts in restricted stocks and government bonds, and finds that a higher volatility of stock returns and longer length of marketability restrictions result in higher illiquidity discounts. As for the restricted stocks, if the volatility of stock returns is 0.2, and the restricted period lasts for one year, the theoretical illiquidity discount will be 11.79 per cent. If the restricted period is extended to five years, the theoretical illiquidity discount will be as high as 40.98 per cent.

Based on the private placement transactions of 138 listed companies for the period August 2000 to July 2001 on the Chinese capital markets, Chen and Xiong (2001) examine the illiquidity discounts in transfers through private placement and auction, and find that transfers through private placement have an average price discount of 85.59 per cent, while those through auction have an average price discount of 77.93 per cent, relative to the otherwise identical freely traded common shares of the same company. Obviously, the illiquidity discounts in these Chinese restricted stocks are much larger than those found in prior studies that use data from the US and other developed capital markets. This phenomenon may result from the uncertainty arising from the marketability restrictions on untradable shares in the Chinese capital markets, for which investors cannot expect a floating date.

Based on the private placement transactions of 376 Chinese listed companies for the period 1998 to 2003, Chen and Yuan (2005) examine the effects of share

⁸ In general, investors value marketability. Therefore, other things being equal, investors will pay more for an asset that is readily marketable than for an otherwise identical asset that is not readily marketable.

illiquidity, government involvement, and market forces on the pricing of earnings, and find that the prices of transfers involving government agencies or state-owned enterprises are largely based on the face value of net assets, without considering their quality and liquidity. However, the prices of transfers between unrelated private entities do reflect earnings information and provide guidance for managers in making investment decisions.

In summary, the above studies mainly examine the illiquidity discounts and the factors influencing the price discount of marketability restrictions. The Reform in 2005 provides us with a specific setting to further examine how marketability affects the price discount, thereby influencing the compensation ratio. With the Reform, the restricted period of untradable shares is clarified, which is similar to the restriction for letter stocks imposed by Rule 144 under the Securities Act of 1993. Undoubtedly, the prior studies provide us with some theoretical insights, and the institutional change helps us re-observe the theoretical and implied values of untradable shares. Transactions through private placement and auction, as alternative methods for trading untradable shares, are considered to be opportunity costs for holders of untradable shares to participate in the Reform, which in turn affects the compensation ratio for these shareholders in making decisions. The higher the illiquidity discounts, the higher the value of trading rights, and the more compensation holders of untradable shares will pay—hence, the higher compensation ratio.

III. HYPOTHESES DEVELOPMENT

Based on the restricted securities of the US capital market, Silber (1991) shows that higher earnings lead to lower illiquidity discounts. Using transactions of untradable shares through auction among Chinese listed companies, Chen and Xiong (2001) find that better accounting performance also leads to lower illiquidity discounts. In addition, based on a sample of transfers of untradable shares through private placement, Chen and Yuan (2005) find that an increase in earnings per share leads to a higher transfer price between unrelated private entities. Therefore, we conjecture that higher profitability means a higher implied price, which provides a theoretical knighthead for prices of current floating shares. Hence, from the perspective of holders of tradable shares, we expect that they will ask for a low compensation ratio. On the other hand, firms with poor operating performance are more likely to experience a performance decline after listing, and the interests of holders of tradable shares will be seriously harmed. They will thus ask for a high compensation ratio from holders of untradable shares of poor performing firms. Based on the above analyses, we put forward Hypothesis 1a as follows:

Hypothesis 1a: *Ceteris paribus*, the higher the earnings on equity, the lower the compensation ratio will be.

Sloan (1996) and Xie (2001) find that the cash flow component of earnings is more persistent relative to the accrual component of earnings. They argue that cash

flows from operations, as a measure of performance, are less subject to distortion than net income figures. This is because the accrual system, which produces the income figures, relies on accruals, deferrals, allocations, and valuations, all of which involve higher degrees of subjectivity than what enters into the determination of cash flows from operations. That is why analysts prefer to relate cash flows from operations to reported net income as a check on the quality of that income. Some analysts believe that a higher ratio of cash flows from operations to net income leads to a higher quality income. In other words, a company with a high level of net income and a low cash flow may be using income recognition or expenses accrual criteria that are suspicious (Bernstein, 1993). Zhao and Wang (1999) find that investors “fixate” on earnings and fail to distinguish between the recurring and non-recurring components of current earnings. However, the proportion of institutional ownership is quite small during their sample period. Recently, institutional investors have been holding an increasing portion of tradable shares of Chinese companies, such as mutual funds. Institutional investors are often viewed as sophisticated investors, as they are better informed and better equipped to process information than are individual investors. Therefore, we expect that when compared with other investors, the institutional investors, especially the large-sized ones, can distinguish between the information content contained in the accrual and cash flow components of earnings, and will pay more attention to the information conveyed by cash flows from operations in financial report analyses. Based on the above analyses, we develop Hypothesis 1b as follows:

Hypothesis 1b: Ceteris paribus, the higher the earnings quality, the lower the compensation ratio will be.

The traditional capital asset pricing model shows that the higher the risks, the higher the returns that investors require. Other capital asset pricing models, such as APT and CAPM based on investment, production, and sales, hold a similar assumption. Therefore, holders of tradable shares require a higher compensation ratio for higher risks.

Based on restricted securities in the US, Longstaff (1995, 2001, 2005), Finnerty (2003), and Bajaj *et al.* (2003) find that higher volatility of stock returns leads to higher illiquidity discounts. Using the private transfer transactions of untradable shares of 138 Chinese listed companies for the period August 2000 to July 2001, Chen and Xiong (2001) also find that a higher volatility of stock returns results in a higher price discount found in the univariate analysis; the relation, however, becomes insignificant in the multiple regressions. Therefore, holders of untradable shares are willing to pay more compensation in exchange for trading rights, because the higher volatility of stock returns means higher opportunity costs for private transfers.

Based on the above studies and the inner relation between the compensation ratio and illiquidity discounts, we put forward Hypothesis 2 as follows:

Hypothesis 2: *Ceteris paribus*, the higher the volatility of stock returns, the higher the compensation ratio will be.

Similar to financial analysts, institutional investors gather, consolidate, and disseminate exclusive information through their dealings and research reports, and are frequently used as a proxy for the presence of informed investors. Therefore, it is reasonable to expect that higher institutional ownership and a better information environment will result in more accounting information being impounded into stock prices. Consistent with this informational role, Utama and Cready (1997) and El-Gazzar (1998) show that market reactions to earnings announcements are smaller with a higher proportion of institutional ownership. Jiambalvo, Rajgopal, and Venkatachalam (2001) find that firms with high institutional ownership have more “timely” prices. To the extent that institutional investment decisions are based on exclusive information, their ownership patterns should convey information to the markets. Bartov, Randhakrishnan, and Krinsky (2000) prove that post-earnings announcement drifts are negatively and significantly correlated with the proportion of institutional ownership.

Based on the role of institutional investors in capital markets, we put forward the following Hypothesis 3, linking Hypotheses 1a, 1b, and 2:

Hypothesis 3: The higher the institutional ownership, the more fundamental accounting information will be impounded into the compensation ratio, such as returns on equity, earnings quality, and volatility of stock returns.

IV. SAMPLE EXPLANATION, VARIABLES DEFINITION, AND DESCRIPTIVE ANALYSIS

4.1 Sample Selection Procedures

As published on the website for the Reform of Split Share Structure, 299 companies began the process for the Reform between 9 May 2005 (the first batch of companies for pilot reform) and 30 November 2005 (the 11th batch of companies for all-round reform).⁹ For inclusion in our final sample, we exclude (1) the companies whose proposals have been rejected; (2) the companies that have not completed the Reform process; and (3) the companies without data on stock returns.¹⁰

According to the first criterion, five firms whose proposals have been rejected are excluded, while according to the second criterion, 113 listed firms are further excluded. After the third criterion is applied, our final sample comprises 169 firms, of which 45 are in the pilot reform stage, and 124 in the all-round reform stage. The specific sample selection procedures are described in Table 1.

⁹ For details, please browse <http://finance.sina.com.cn/stock/chinaggzw/index.shtml>. The CSMAR database does not provide the monthly returns for 12 individual stocks (002039-002050), which were listed on the SME board after 2005.

Table 1 Sample Selection Procedures (9 May 2005–30 November 2005)

Procedures	Observations
Total number of firms undergoing the Reform	299
Excluding firms whose proposals are rejected	(5)
Excluding firms who have not completed the Reform process	(113)
Excluding firms without data on stock returns	(12)
Observations in the final sample	169
Including: Observations in the pilot reform stage	45
Observations in the all-round reform stage	124

4.2 Variables Definitions

Dependent Variables

Compensation ratio (DJ) is the comprehensive compensation paid by holders of untradable shares to holders of tradable shares per 10 tradable shares in exchange for trading rights.¹¹

Giving shares to holders of tradable shares is a major means of compensation. Other means include reverse stock split of untradable shares, warrants, cash payouts, put options, single directional capital conversion, asset restructuring, capital injection, and so on. As a measure of the compensation ratio, we aggregate all means into a single measure by converting them into shares paid by holders of untradable shares to holders of tradable shares (for details on the calculation of compensation ratio, please refer to Appendices I and II). Meanwhile, holders of untradable shares may use other means, such as giving undertakings or extending the length of marketability restrictions, to compensate holders of tradable shares. These other means should be taken into account when considering the comprehensive compensation ratio, but because they are hard to calculate reasonably, we control for these variables in our multiple regressions.

Explanatory Variables

In this paper, returns on equity (ROE) is defined as the latest annual returns on equity before the publication of the Split Share Structure Reform Explanatory Memorandum. We expect that investors may prefer to use the latest accounting

¹¹ The compensation ratio can be considered from two perspectives: holders of untradable shares and holders of tradable shares. For holders of tradable shares, the compensation ratio is the pay-in ratio; for holders of untradable shares, it is the pay-out ratio. In this paper, we focus on the pay-in ratio, because the most important factor influencing the pay-out ratio is the proportion of untradable shares, that is, the higher the untradable share ownership, the higher will be the costs for trading rights. In the game of Split Share Structure Reform, will holders of tradable shares ask for a higher compensation ratio in view of higher untradable share ownership? We use the proportion of untradable shares as a control variable in this study, which is in fact considered to be the key factor influencing the pay-out ratio.

information, and thus we use the latest quarterly returns on equity in our robustness check. In addition, we use return on assets (*ROA*) as an alternative measure of operating performance (please refer to the robustness check).

Based on Sloan (1996), the earnings quality could be analysed in terms of cash flow and the accrual components of current earnings, respectively. In this study, we divide the *ROE* into cash flow returns on equity (*CF*) and accrual returns on equity (*ACCR*). Based on prior findings, we expect that higher cash flow returns on equity will result in higher earnings quality.

Based on Longstaff (1995, 2001, 2005), the volatility of stock returns is one of the main factors influencing illiquidity discounts. In this paper, we use the natural logarithm of the standard deviation of monthly stock returns for the year 2004 as the measure of risks. We also use other proxies to measure risks in our robustness check.

Control Variables

In this paper, control variables include firm size, institutional ownership, proportion of untradable shares, the length of marketability restrictions, undertakings, and types of controlling shareholder and market. All these factors may influence the compensation ratio. The reasons are as follows.

Firm size: The larger a firm is, the less information asymmetry there will be, resulting in lower information costs paid by holders of tradable shares during the Reform. In addition, less information asymmetry means lower monitoring costs required after the Reform. Therefore, from the perspective of holders of tradable shares, a larger firm requires a lower compensation ratio. On the other hand, from the perspective of holders of untradable shares, the larger a firm is, the more visible will be the information environment, leading to lower illiquidity discounts, as supported by the findings of Silber (1991) and Chen and Xiong (2001).

Institutional ownership: Since institutional investors gather, consolidate, and disseminate exclusive information through their dealings and research reports and are frequently used as a proxy for sophisticated investors, we expect that higher institutional ownership will lead to less information asymmetry.

Proportion of untradable shares: A higher proportion of untradable shares means a greater potential number of tradable shares converted from untradable shares after the Reform, and a greater impact on the current holders of tradable shares; therefore, the compensation ratio required by holders of tradable shares is higher. In addition, Silber (1991), Bajaj *et al.* (2003), and Chen and Xiong (2001) find that a higher proportion of restricted shares in total shares means greater illiquidity discounts, which means higher opportunity costs for private transfers as an alternative to the Reform. In other words, holders of untradable shares are willing to pay at a higher compensation ratio in the Reform.

Length of marketability restrictions: From the perspective of holders of tradable shares, the longer the marketability restriction, the longer the lagged impact of liquidity pressure will last on the current holders of tradable shares. Therefore, *ceteris paribus*, the longer the marketability restrictions of untradable shares, the lower

will be the compensation ratio required by holders of tradable shares. From the perspective of holders of untradable shares, longer marketability restrictions will lower their ability to time the market, and so they are more likely to lose capacity for freely adjusting their asset portfolios. Therefore, holders of untradable shares are willing to pay at a lower compensation ratio.

Undertakings: As a supplementary measure of the compensation ratio, undertakings given by holders of untradable shares can make the capital market more stable to some extent. Therefore, more undertakings given by holders of untradable shares requires a lower compensation ratio by holders of tradable shares. For holders of untradable shares, more undertakings means higher opportunity costs after the Reform, and they are thus willing to pay at a lower compensation ratio.

Type of controlling shareholder: In state-controlled listed firms, the chairman is just the legal representative in form, not the real owner of the wealth, and this may cause the agency problem. In addition, political pressure and the process for application and approval may differ between listed firms controlled by the state and those that are not. Therefore, we control for the type of controlling shareholder in the multiple regressions.

Type of market: Generally, small firms have high growth potential, and the value of these firms depends not on current performance but on their future. Because the performance of high growth firms is more sensitive to business cycles and industry factors (Jin, Zhang, and Chen, 2005), holders of tradable shares may require a higher compensation ratio for small firms listed on the SME board due to the higher uncertainty.

Table 2 presents simple descriptions of the variables.

Data Source

The compensation ratio, undertakings, and length of marketability restrictions are sourced from the Split Share Structure Reform Explanatory Memoranda (full texts and revisions) and corresponding implementation announcements released by listed firms. Historical financial data (such as returns on equity, cash flows from operations and accruals) and monthly stock returns are obtained from the China Stock Market and Accounting Research (CSMAR) database. The latest financial data are hand-collected from the annual reports of listed firms.

4.3 Descriptive Statistics

Table 3 reports the descriptive statistics for the interested variables. First, the mean (median) compensation ratio at which holders of untradable shares pay to holders of tradable shares is 3.31 (3.30). The highest is 5 and the lowest is 1, with a standard deviation of 0.64. These figures indicate that the variance of compensation ratio is high. Second, among the main explanatory variables, the mean and median of *ROE* are 15.10 per cent and 13.32 per cent, respectively. Among the components of earnings, the mean (median) of accrual returns is -0.62 (-2.80), and the mean (median) of cash flow returns is 15.72 (15.09), respectively, indicating that the cash flow components dominate over the accrual components of earnings in our sample. In other words, 169 firms in our final sample generally have good earnings quality.

Table 2 Description of Variables

Variables	Symbols	Description
Dependent variable:		
Compensation ratio	<i>DJ</i>	Number of shares acquired from holders of untradable shares for every 10 tradable shares held.
Explanatory variables:		
Returns on equity	<i>ROE</i>	Latest annual returns on equity before publication of Explanatory Memorandum.
Cash flow returns	<i>CF</i>	Latest annual cash flow returns on equity before publication of Explanatory Memorandum.
Accrual returns	<i>ACCR</i>	Latest annual accrual returns on equity before publication of Explanatory Memorandum.
Volatility of stock returns	<i>VOLA</i>	Natural logarithm of standard deviation of monthly stock returns for 2004. ¹²
BETA coefficient	<i>BETA</i>	Beta coefficients calculated based on weekly stock returns, and market returns weighted by free float.
Control variables:		
Firm size	<i>SIZE</i>	Natural logarithm of total assets for latest year before publication of Explanatory Memorandum.
Proportion of untradable shares (per cent)	<i>NPROP</i>	Proportion of untradable shares for latest year before publication of Explanatory Memorandum.
Institutional ownership (per cent)	<i>IS</i>	Latest institutional ownership before publication of Explanatory Memorandum.
Length of marketability restrictions (years)	<i>TIME</i>	Statutory restricted period (one year) plus additional restricted periods promised by large holders of untradable shares.
Undertakings	<i>MEAN</i>	Amount of undertakings given by holders of untradable shares.
Type of controlling shareholder	<i>OWN</i>	Dummy variable, coded 1 if a firm is actually controlled by the state, and 0 otherwise.
Type of market	<i>MARKET</i>	Dummy variable, coded 1 if a firm is listed on the main board (Shanghai Stock Exchange or Shenzhen Stock Exchange), and 0 otherwise.

As for the control variables, we notice that institutional ownership varies greatly across our sample, from the lowest at 0 to the highest at 63.54 per cent. Over half the companies have marketability restrictions of more than two years, with the longest at six years; 25 per cent of the companies give more than one undertaking, the highest being four, which show that holders of untradable shares have tried

¹² Our conclusions still hold when using the natural logarithm of standard deviation of daily stock returns for 2004.

complex designs to gain approval of proposals for the Reform. In addition, firm size and proportion of untradable shares also vary to a large extent, which shows that ours is a good representative sample. Last, the descriptive statistics of the two dummy variables show that 43 per cent of the 169 firms are controlled by the state and state legal persons; 22 per cent are listed on the Shenzhen SME board after 2004.

Table 3 Descriptive Statistics

Variables	N	Mean	Median	Std. dev.	Min	Q1	Q3	Max
<i>DJ</i>	169	3.31	3.30	0.64	1	3	3.60	5
<i>ROE</i>	169	15.10	13.32	11.25	-39.40	8.58	19.75	72.62
<i>CF</i>	169	15.72	15.09	30.50	-91.67	1.72	28.44	99.33
<i>ACCR</i>	169	-0.62	-2.80	29.36	-88.42	-12.12	8.89	127.98
<i>VOLA</i>	169	2.25	2.25	0.37	1.11	2	2.47	3.32
<i>BETA</i>	169	1.14	1.09	0.38	0.18	0.91	1.35	2.62
<i>SIZE</i>	169	12.07	11.96	1.11	9.16	11.24	12.73	15.74
<i>IS</i>	169	13.01	6.96	13.91	0	1.22	22.34	63.54
<i>NPROP</i>	169	65.89	67.92	10.36	38.61	60	73.33	94.67
<i>TIME</i>	169	2.30	2	1.16	1	1	3	6
<i>MEAN</i>	169	0.86	1	0.97	0	0	1	4
<i>OWN</i>	169	0.43	0	0.50	0	0	1	1
<i>MARKET</i>	169	0.78	1	0.42	0	1	1	1

4.4 Correlation Analysis

Table 4 presents the correlations between interested variables. The correlations result from the univariate analysis, which provides the statistical relations between interested variables without controlling for other variables. In addition, analysing the correlation between independent variables is helpful for avoiding the possible multicollinearity problem in the research design.

Based on the Pearson correlation coefficients between interested variables, we find that the compensation ratio is significantly and negatively correlated with both *ROE* and cash flow returns at the 1 per cent significance level, while the *ROE* is significantly and positively correlated with institutional ownership. The accrual returns is significantly and negatively correlated with cash flow returns (-0.93). To avoid multicollinearity, we use different models separately to test the relationship between accrual returns, cash flow returns, and the compensation ratio. The cash flow returns are significantly and positively correlated with firm size and firms listed on the main board. The volatility of stock returns is significantly and negatively correlated with firm size, state-controlled firms, and firms listed on the main board. Firm size is significantly and positively correlated with state-controlled firms and firms listed on the main board. The proportion of untradable shares is significantly and negatively correlated with the length of marketability restriction. State-controlled firms are significantly and positively correlated with firms listed on the main board.

Table 4 Pearson Correlations

	<i>ROE</i>	<i>ACCR</i>	<i>CF</i>	<i>VOLA</i>	<i>BETA</i>	<i>SIZE</i>	<i>IS</i>	<i>NPROP</i>	<i>TIME</i>	<i>MEAN</i>	<i>OWN</i>	<i>MARKET</i>
<i>DJ</i>	-0.21***	0.30***	-0.36***	0.15**	0.23***	-0.20***	-0.21***	0.39***	-0.20***	-0.18**	-0.10	-0.13*
<i>ROE</i>	0.09	0.28***	0.28***	-0.07	-0.24***	0.05	0.34***	0.08	0.16**	-0.01	-0.02	-0.04
<i>ACCR</i>			-0.93***	0.12	0.29***	-0.22***	0	0.16**	-0.002	-0.01	-0.20**	-0.29***
<i>CF</i>				-0.15*	-0.36***	0.24***	0.13*	-0.13*	0.06	0.006	0.18**	0.26***
<i>VOLA</i>					0.56***	-0.33***	-0.13*	0.02	0.04	-0.10	-0.22***	-0.33***
<i>BETA</i>						-0.46***	-0.33***	0.07	0.02	-0.10	-0.29***	-0.58***
<i>SIZE</i>							0.12	-0.02	-0.01	0.11	0.41***	0.54***
<i>IS</i>								-0.01	0.12	0.08	0.03	-0.001
<i>NPROP</i>									-0.25***	-0.08	-0.04	-0.19**
<i>TIME</i>										0.01	-0.12	-0.03
<i>MEAN</i>											-0.07	0.05
<i>MARKET</i>												0.30***

Note: *, **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

V. MODEL AND EMPIRICAL RESULTS

5.1 Compensation Ratio, Returns on Equity, Earnings Quality, and Risks

To test Hypotheses 1a, 1b, and 2, we run the following multiple regressions:

$$DJ_i = \alpha_0 + \alpha_1 * ROE_i + \alpha_2 * VOLA + \sum_{j=3}^n \alpha_j * control_j + \varepsilon_i \quad (1)$$

$$DJ_i = \beta_0 + \beta_1 * ACCR_i + \beta_2 * VOLA + \sum_{j=3}^n \beta_j * control_j + \varepsilon_i \quad (2)$$

$$DJ_i = \gamma_0 + \gamma_1 * CF_i + \gamma_2 * VOLA + \sum_{j=3}^n \gamma_j * control_j + \varepsilon_i \quad (3)$$

$$DJ_i = \lambda_0 + \lambda_{11} * ACCR_i + \lambda_{12} * CF_i + \lambda_2 * VOLA + \sum_{j=3}^n \lambda_j * control_j + \varepsilon_i \quad (4)$$

Based on Hypotheses 1a, 1b, and 2, we expect that α_1 (γ_1 , λ_{12}) will be less than zero, and α_2 (β_2 , γ_2 , λ_2) greater than zero.

Table 5 provides the multiple regression results.¹³ In Model 1, the coefficient of returns on equity (*ROE*) is -0.01 and the t-statistic is -2.47 , indicating that higher returns on equity lead to a lower compensation ratio. In other words, the compensation ratio reflects the firm's profitability. This finding supports Hypothesis 1a. In Models 2 and 3, we find that the coefficient of cash flow returns is -0.01 , and that of accrual returns is 0.01 , and that both are statistically significant at the 1 per cent level. These two coefficients indicate that both higher cash flows and higher accruals lead to a lower compensation ratio. Bernstein (1993) finds that a company with a high level of net income and a low cash flow may be using suspicious income recognition or expenses accrual criteria. Sloan (1996) finds that the earnings persistence of cash flow is higher, relative to the accrual component of earnings. Based on their findings, it is natural to conjecture that higher cash flow components of earnings mean higher earnings quality. Therefore, our findings suggest that higher earnings quality results in a lower compensation ratio. In other words, holders of tradable shares can see through the earnings quality, and so reduce their requirement for the compensation ratio in the negotiation. Meanwhile, holders of untradable shares can use earnings quality as a weight to adjust their payment. This finding supports Hypothesis 1b.

¹³ VIF indicates that there is no multicollinearity problem between independent variables.

Table 5 Multiple Regression Results

	Model 1		Model 2		Model 3		Model 4	
	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
<i>INTERCEPT</i>	2.88***	4.01	2.83***	3.99	2.82***	4.05	2.83***	4.07
<i>ROE</i>	-0.01***	-2.47						
<i>ACCR</i>			0.01***	3.25				
<i>CF</i>					-0.01***	-4.10	-0.01***	-1.45
<i>VOLA</i>	0.12*	1.95	0.13**	2.03	0.12***	2.97	0.11*	-2.83
<i>SIZE</i>	-0.09*	-1.73	-0.08	-1.62	-0.08	-1.55	-0.08	1.91
<i>IS</i>	-0.004	-1.33	-0.01***	-2.31	-0.01*	-1.86	-0.004	-1.54
<i>NPROP</i>	0.02***	5.26	0.02***	4.65	0.02***	4.84	0.02***	-1.33
<i>TIME</i>	-0.04	-1.04	-0.06	-1.48	-0.05	-1.28	-0.04	5.02
<i>MEAN</i>	-0.08*	-1.81	-0.08*	-1.77	-0.08*	-1.87	-0.09*	-1.06
<i>OWN</i>	-0.06	-0.58	-0.02	-0.22	-0.02	-0.21	-0.03	-1.93
<i>MARKET</i>	0.09	0.66	0.16	1.25	0.17	1.33	0.15	-0.28
Number of firms	169		169		169		169	
<i>Adj-R</i> ²	24.1%		26.1%		28.7%		29.2%	

Note: *, **, and *** denote 10%, 5%, and 1% levels of significance, respectively.

In the four multiple regression models, the values of volatility of stock returns are all significantly positive, which shows that a higher volatility of stock returns leads to a higher compensation ratio. This result is consistent with the findings of Longstaff (1995, 2001, 2005) and Chen and Xiong (2001) that higher volatility of stock returns leads to higher illiquidity discounts. This result supports Hypothesis 2.

For the control variables, the results indicate that only the proportion of untradable shares and undertakings show statistical significance. A higher proportion of untradable shares means a higher potential number of tradable shares converted from untradable shares, and a more profound impact on current holders of tradable shares. Therefore, the current holders of tradable shares will require a higher compensation ratio. Silber (1991) and Chen and Xiong (2001) find that a higher proportion of restricted shares leads to larger illiquidity discounts, meaning higher opportunity costs of the Reform for the higher proportion of untradable shares. Therefore, holders of untradable shares are willing to pay at a higher compensation ratio. In Models 1, 2, and 3, the coefficients of undertakings are all -0.08 , whereas, the coefficient is -0.09 in Model 4. They are all significantly negative at the 10 per cent level. This indicates that the more undertakings that are given, the lower the compensation ratio. In Models 2 and 3, institutional ownership is significantly and negatively correlated with the compensation ratio in both cases; while in the other two models, the correlation is also negative but insignificant. Therefore, the compensation ratio is low in general for firms with high institutional ownership.

Other control variables, such as firm size, length of marketability restriction, and types of controlling shareholder and market, are not significantly correlated with the compensation ratio.

5.2 Institutional Ownership and Compensation Ratio

To test Hypothesis 3 for whether or not institutional ownership influences the relationship between accounting fundamentals and compensation ratio, we set the cut-off point at 5 per cent, and classify the firm as having high institutional ownership if this is larger than 5 per cent. After partition, we construct the dummy variable *HIS* to measure the high institutional ownership group,¹⁴ and *LIS* to measure the low institutional ownership group. Finally, we run the following multiple regression models:

$$DJ_i = \alpha_{01} + \alpha_{02} * HIS_i + \alpha_{11} * LIS_ROE_i + \alpha_{12} * HIS_ROE_i + \alpha_{21} * LIS_VOL A_i + \alpha_{22} * HIS_VOL A_i + \sum_{j=3}^n \alpha_j * control_j + \varepsilon_i \quad (5)$$

$$DJ_i = \beta_{01} + \beta_{02} * HIS_i + \beta_{11} * LIS_ACCR_i + \beta_{12} * HIS_ACCR_i + \beta_{21} * LIS_VOL A_i + \beta_{22} * HIS_VOL A_i + \sum_{j=3}^n \beta_j * control_j + \varepsilon_i \quad (6)$$

¹⁴ Other cut-off points are used in the robustness check.

$$\begin{aligned}
 DJ_i = & \gamma_{01} + \gamma_{02} * HIS_i + \gamma_{11} * LIS_CF_i + \gamma_{12} * HIS_CF_i + \gamma_{21} * LIS_VOLA_i \\
 & + \gamma_{22} * HIS_VOLA_i + \sum_{j=3}^n \gamma_j * control_j + \varepsilon_i
 \end{aligned} \tag{7}$$

$$\begin{aligned}
 DJ_i = & \lambda_{01} + \lambda_{02} * HIS_i + \lambda_{111} * LIS_ACCR_i + \lambda_{112} * HIS_ACCR_i + \lambda_{121} * LIS_CF_i \\
 & + \lambda_{122} * HIS_CF_i + \lambda_{21} * LIS_VOLA_i + \lambda_{22} * HIS_VOLA_i \\
 & + \sum_{j=3}^n \lambda_j * control_j + \varepsilon_i,
 \end{aligned} \tag{8}$$

where, $HIS_VARIABLE_i$ is the interaction term between HIS and relative explanatory variables, and $LIS_VARIABLE_i$ the interaction term between $(I - HIS)$ and relative explanatory variables.

According to Hypothesis 3, the higher the institutional ownership, the more fundamental information, such as returns on equity, earnings quality, and risks, will be reflected in the compensation ratio. Thus, we expect that α_{11} (γ_{11} , λ_{121}) and α_{21} (β_{21} , γ_{21} , λ_{21}) are not significantly different from zero, while α_{12} (γ_{12} , λ_{122}) and α_{22} (β_{22} , γ_{22} , λ_{22}) are significantly different from zero.

Table 6 presents the results of the impact of institutional ownership on the relationship between compensation ratio and accounting fundamentals. The results show that the dummy variable of the high institutional ownership group is significantly and negatively correlated with the compensation ratio at the 1 per cent level in all four multiple regression models, which means that the compensation ratio of firms with high institutional ownership is lower, relative to the low institutional ownership group.¹⁵ In Model 5, the coefficient of the interaction term between the high institutional ownership group and returns on equity is -0.013 and is significant at the 5 per cent level. The coefficient of the interaction term between the low institutional ownership group and returns on equity is also negative (-0.009), but not significant. The results indicate that for firms with high institutional ownership, higher returns on equity means a lower compensation ratio. However, this relationship is not tenable for firms with low institutional ownership. In other words, the impact of returns on equity on the compensation ratio depends on institutional ownership, which is consistent with the role of institutional investors as sophisticated investors.

In Model 6, the coefficient of the interaction term between the high institutional ownership dummy variable and accrual returns is 0.007 , and is significant at the 1 per cent level, while the coefficient of the interaction term between the low institutional ownership group and accrual returns is also positive, but not significant. In Model 7, the coefficient of the interaction term between the high institutional ownership group and cash flow returns is -0.007 and is significant at the 1 per cent level, while the coefficient of the interaction term between the low institutional

¹⁵ The reasons for the significant and negative correlation of institutional ownership with the compensation ratio will be further examined in future studies.

Table 6 Multivariate Analysis — Institutional Investor vs. Individual Investor

	Model 5		Model 6		Model 7		Model 8	
	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
INTERCEPT	3.966***	4.93	3.770***	4.93	3.627***	4.83	3.876***	4.98
HIS	-1.899***	-3.31	-1.701***	-3.05	-1.590***	-2.88	-1.669***	-3.00
LIS_ROE	-0.009	-1.63						
HIS_ROE	-0.013**	-2.09						
LIS_ACCR			0.002	0.73			-0.011*	-1.76
HIS_ACCR			0.007***	3.44			-0.003	-0.58
LIS_CF					-0.003	-1.50	-0.01	-1.62
HIS_CF					-0.007***	-3.99	-0.013***	-2.19
LIS_VOLA	-0.364	-1.64			-0.313	-1.64	-0.332	-1.54
HIS_VOLA	0.387***	2.56	-0.316	-1.62	0.333**	2.26	0.323***	2.19
SIZE	-0.075	-1.48	-0.059	-1.19	-0.052	-1.07	-0.063	-1.27
NPROP	0.023***	5.18	0.019***	4.28	0.02***	4.65	0.020***	4.61
TIME	-0.045	-1.16	-0.065*	-1.74	-0.053	-1.46	-0.047	-1.26
MEAN	-0.095**	-2.11	-0.086*	-1.93	-0.090**	-2.07	-0.094**	-2.15
OWN	-0.030	-0.31	0.009	0.09	0.011	0.11	-0.001	-0.01
MARKET	0.090	0.71	0.141	1.12	0.146	1.18	0.150	1.21
Number of firms	169	169	169	169	169	169	169	169
Adj-R ²	27.6%	27.6%	29.8%	29.8%	32%	32%	32.7%	32.7%

Note: *, **, and *** denote 10%, 5%, and 1% levels of significance, respectively. *HIS* is a dummy variable, which is equal to one if a firm is in the high institutional ownership group, and zero otherwise. *HIS_VARIABLE_i* is the interaction term between the high institutional ownership dummy variable and interested variables; *LIS_VARIABLE_i* is the interaction term between the low institutional ownership dummy variable and interested variables.

ownership group and cash flow returns is also negative, but not significant. The results from Models 6 and 7 indicate that firms with high institutional ownership are better able to see through earnings quality. Lower cash flow returns or higher accrual returns both lead to a higher compensation ratio.

While the coefficient of the interaction term between the high institutional ownership group and the volatility of stock returns is significantly positive in all four models, the same coefficient between the low institutional ownership group and the volatility of stock returns is not significant in the four models. The results show that the impounding of fundamental factors into the compensation ratio is largely caused by institutional investors. For firms with fewer institutional investors, fundamental variables, such as returns on equity, accrual returns, cash flow returns, and volatility of stock returns, are not significantly correlated with the compensation ratio.

The control variables in Table 6 are basically consistent with the results in Table 5. In summary, the results from Table 6 support Hypothesis 3 that higher institutional ownership means that more accounting fundamental information is impounded into the compensation ratio.

VI. ROBUSTNESS CHECK

To strengthen the reliability of results, we carry out the following robustness checks.

First, to test whether results remain robust by other risk measures, we substitute other risk proxies for the volatility of monthly stock returns; the results are qualitatively unchanged. In particular, we use the following alternative risk proxies: (1) Beta coefficient¹⁶ based on returns weighted by total market value; (2) Beta coefficient based on returns weighted by free float; and (3) volatility of stock returns based on the standard deviation of daily stock returns.

Another robustness check is to verify whether results are sensitive to other accounting performance measures. Specifically, we use the following two proxies: (1) annualised measures of returns on equity, accrual returns, and cash flow returns,¹⁷ taking into account that investors may prefer the latest accounting performance in decision making; and (2) returns on assets. We substitute these two proxies for annual returns on equity, and re-run all regressions. Similar results are found.

Third, to test whether different cut-off points of institutional ownership influence our conclusions, we try (1) sorting the institutional ownership in ascending order, dividing the sample into three groups, and then combining the second and third groups into one group—the first group being regarded as the group of firms with low institutional ownership, and the other as the group with high institutional

¹⁶ Ordinary least squares estimates of market model parameters derived from daily stock returns for 2004.

¹⁷ Annualised returns on equity = (net income * 4) / equity, based on first-quarter accounting information; = (net income * 2) / equity, based on second-quarter accounting information; = (net income * 4/3) / equity, based on third-quarter accounting information. This method is also applicable to the calculation of annualised accrual returns and cash flow returns.

ownership; and (2) using a cut-off point at less than 5 per cent to classify institutional ownership. These tests do not change our conclusions.

We also use specific items of undertaking as control variables, and find that the results are not changed.

Finally, we use a sample consisting only of firms offering compensation through giving shares, and then re-run the multiple regressions. The conclusions still hold.

VII. CONCLUSIONS AND IMPLICATIONS

Based on 169 Chinese listed firms that have completed the process for the Reform from 9 May 2005 to 30 November 2005, we examine the determinants of compensation ratio, and the question of whether the participation of institutional investors influences the impounding of firm-specific fundamental information into the compensation ratio. Our empirical results show that the compensation ratio does indeed reflect the information contained in earnings; in particular, higher returns on equity and earnings quality lead to a lower compensation ratio. In addition, we find that a higher volatility of stock returns leads to a higher compensation ratio; furthermore, the participation of institutional investors increases the effectiveness of returns on equity, earnings quality, and volatility of stock returns in explaining the compensation ratio. Finally, we find that the compensation ratio is also affected by firm size, the proportion of untradable shares, marketability restrictions, and undertakings given.

Our results have important implications for the further implementation of the Split Share Structure Reform in Chinese listed companies.

1) If fundamental information, such as returns on equity, earnings quality, and the volatility of stock returns, cannot be reflected in the compensation ratio, the decision of the compensation may be distorted. For those firms with high institutional ownership, both holders of tradable shares and of untradable shares do take into account this fundamental information when negotiating the compensation, while shareholders of other firms do not.

2) For holders of tradable shares, our findings are helpful for better understanding the relationship between accounting fundamentals and the compensation ratio, and for finding out the factors determining the compensation ratio.

3) For holders of untradable shares, our findings are helpful for designing reasonable compensation proposals based on fundamental information about earnings quality, share ownership, and so forth.

4) For related government agencies, this study is helpful for drawing up effective guidelines and pertinent administrative measures to guarantee the success of the Reform.

5) Chen and Yuan (2005) find that the transfer prices of private placement are largely based on the net assets per share, without considering earnings per share. However, our results indicate that with the Reform, the compensation ratio is mainly based on returns on equity and earnings quality due to the certainty of floating dates for untradable shares; this in turn means that the Reform does enhance the price

discovery function of the capital market. Therefore, from the standpoint of corporate governance, the implementation of the Split Share Structure Reform does help to transfer the focus of shareholders from static net assets to dynamic profitability for wealth maximisation. Doubtlessly, this change will promote a convergence of interests between shareholders and the company.

REFERENCES

Please see P.18–19

APPENDIX I EXPLANATION OF THE COMPENSATION RATIO

1. Compensation Ratio Calculation for a Single Proposal

1) Direct share giving:

Compensation ratio = the number of shares acquired from holders of untradable shares for every 10 tradable shares.

2) Indirect share giving:

Compensation ratio = the number of shares acquired from holders of untradable shares for every 10 tradable shares, based on the share capital after the indirect share giving.

3) Single directional capital conversion: discounted capital conversion to all shareholders.

The proportion of capital conversion to all shareholders = number of shares converted / total share capital before capital conversion.

Compensation ratio = total untradable shares * the proportion of capital conversion to all shareholders / tradable shares after capital conversion.

4) Cash payout:

Compensation ratio = cash payout per 10 shares / last closing price before the announcement date of the Reform.

5) Reverse stock split:

Compensation ratio = number of merged stocks * 10 / total share capital after the reverse split.

6) Warrants:

Compensation ratio = the theoretical value of one warrant * number of warrants / last closing price before the announcement date of the Reform.

7) Capital injection:

Compensation ratio = injected cash per 10 shares / last closing price before the announcement date of the Reform.

8) Asset restructuring:

a. Injecting assets (including cash and equity) or replacements (equivalent to direct asset injection): Compensation ratio = value of assets injected * 10 / (last total share capital * last closing price before the announcement date of the Reform);

b. Exemption of debt (including debt waivers from creditors for untradable shares, except for debts paid by shares):

Compensation ratio = debt exempted * 10 / (last total share capital * last closing price before the announcement date of the Reform);

c. Cash for debt by holders of untradable shares:

Compensation ratio = decrease in expected loss in net assets per share * 10 / last closing price before the announcement date of the Reform.

2. Compensation Ratio Calculation for a Combined Proposal

1) Calculating compensation ratio separately, and then aggregating the results.

2) If the proposal includes indirect share giving and cash payout, the calculation for the portion of cash payout is as follows:

Compensation ratio = cash payout per 10 shares / last closing price before the announcement date of the Reform (as if without indirect share giving).

3) If the proposal includes indirect share giving and warrants, the calculation for the portion of warrants is as follows:

Compensation ratio = the theoretical value of one warrant * number of warrants / last closing price before the announcement date of the Reform (as if without indirect share giving).

4) If the proposal involves equity only, including direct share giving, indirect share giving, single directional capital conversion, and reverse stock split, the following method may also be used:

Compensation ratio = (the proportion of tradable shareholdings after implementation – the proportion of tradable shareholdings before implementation) * 10 / the proportion of tradable shareholdings before implementation.

APPENDIX II COMPENSATION RATIO CALCULATION FOR REPRESENTATIVE PROPOSALS

G Agricultural Products (000061): During the last five trading days of the twelfth month from the date of implementation, all holders of tradable shares have the right to sell their tradable shares to the Shenzhen State-Owned Assets Supervision and Administration Commission at 4.25 renminbi per share. Obviously, this is a European put option with a duration of 360 days and a strike price at 4.25 renminbi. Based on the one-year term deposit interest rate of 2.25 per cent announced by the People's Bank of China, and with the closing price before the Reform announcement at 3.40 renminbi and the annual volatility of stock returns at 0.2946, we use the Black-Scholes option pricing model to calculate the value of this put option, which is equal to 0.916 renminbi. Therefore, the compensation ratio for the proposal offered by Agricultural Products is 2.69 ($0.916 * 10 / 3.4$).

G Aodong (000623): Untradable shares are merged at the ratio of 1:0.6074, while cash dividends are paid to all shareholders. Holders of untradable shares pay all their cash dividends to holders of tradable shares, and the actual pre-tax cash payout received by holders of tradable shares is 4 renminbi per 10 shares. Based on the latest proportion of tradable shares (0.5355) before the Reform announcement, the compensation ratio is equal to 2.23 with the reverse split ratio at 1:0.6074. The detailed calculation is as follows: Assume there are 100 shares of G Aodong, of which 53.55 shares are tradable and 46.45 shares untradable, based on the proportion of tradable shares of 0.5355 before the Reform. If the untradable shares merge at 1:0.6074, this firm will, after the reverse split, have 53.55 tradable shares and 28.21 ($46.45 * 0.6074$) untradable shares. The proportion of tradable shares will thus be 0.6549 ($53.55 / (53.55 + 28.21)$). Therefore, the compensation ratio for the reverse split is 2.23 ($((0.6549 - 0.5355) * 10 / 0.5355)$). Based on the last closing price of 5.90 renminbi before the Reform announcement, the actual pre-tax cash payout of 4 renminbi per 10 shares should mean that the compensation ratio is equal to 0.66 ($4 * (1 - 0.2) * 1.223 / 5.9$, where 0.2 is the tax rate). As a result, the total compensation ratio for the reverse split and cash payout is 2.89 ($2.23 + 0.66$).

G Zhongfu (000659): Holders of tradable shares receive 2.5 shares and cash of 0.772 renminbi per 10 shares held. The compensation ratio is equal to 2.73 ($2.5 + 0.772 * 0.8 * 1.25 / 3.39$) based on the last closing price of 3.39 renminbi before the Reform announcement and the shares given by holders of untradable shares.

G Wuhan Steel Processing (600005): Holders of tradable shares receive 2.5 shares, 2.5 call options, and 2.5 put options for every 10 shares held. With each put option, the shareholder can sell one share to the firm at 3.13 renminbi. With each call option, the shareholder can buy one share from the firm at 2.90 renminbi. Both are European options with a duration of 12 months. The price of each put option is calculated at 0.153 renminbi, based on the one-year term deposit interest rate of 2.25 per cent, an exercise price at 3.13 renminbi, the last closing price of 3.45 renminbi before the Reform announcement, and an annual volatility of 0.2397. The price of each call option is calculated at 0.701 renminbi, based on an exercise price of 2.90

renminbi. Finally, the compensation ratio is equal to 3.27 ($0.153 * 2.5 * 1.25 / 3.45 + 0.701 * 2.5 * 1.25 / 3.45 + 2.5$), based on the shares given by holders of untradable shares, the last closing price before the Reform announcement, and the number of put and call options.