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Designated Market Makers: Competition and Incentives

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Designated market makers: Competition and incentives

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August 8, 2020

Abstract

Do competition and incentives offered to designated market makers (DMMs) improve market liquidity? Using data from the NYSE Euronext Paris, we show that an exogenous increase in competition among DMMs leads to a significant decrease in quoted and effective spreads, mainly through a reduction in the realized spread. In contrast, changes in incentives, through small changes in rebates and requirements for DMMs, do not have any tangible effect on market liquidity. Our analysis shows that incentivizing DMMs might not necessary lead to an improvement of market liquidity unless exchanges induce greater competition among DMMs.

JEL classification: G12; G14

Keywords: Designated market makers; DMMs; Liquidity provision

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1 Introduction

Electronic market making is widespread throughout the world today, and many major stock exchanges (the New York Stock Exchange, Euronext, the London Stock Exchange, and Deutsche Börse, among others) have market-making agreements in place with electronic traders. The role of designated market makers (DMMs) in exchanges, now largely played by high-frequency traders (HFTs), and their influence on market quality is not well understood and requires a careful empirical examination to conclude whether competition among DMMs and the incentives offered to them could affect overall market liquidity.[1] Aït-Sahalia and Sağlam (2017), for example, highlight the theoretical effect of competition among DMMs; however, to the best of our knowledge, no papers have yet studied this aspect empirically. The previous literature has tended to concentrate on either making/taking fees (Malinova and Park (2015), among others) or a combination of making/taking fees and market-making requirements (e.g., Bessembinder, Hao, and Zheng (2019)). In this paper, we aim to fill this void, and we empirically compare two mechanisms by which exchanges influence market liquidity provision, that is, promoting competition and offering incentives, specifically for HFTs who are willing to act as DMMs. In particular, we attempt to disentangle the effects of competition from those of incentives and assess the effectiveness of each aspect as a policy instrument to improve market liquidity. We probe the role of competition that arises because a particular subset of HFTs is privileged and obligated to assume the role of a DMM, and this subset of HFTs is determined and altered from time to time by the exchange.

Stock exchanges employ several instruments at their disposal to stimulate DMMs to provide market liquidity. These instruments can be classified into two broad categories: (1) the competitive environment imposed on DMMs and (2) the incentives or benefits offered and

[1] We use the term "designated market makers" in this context to emphasize the fact that such traders enter into a written agreement with the exchange, although their exact role in the market and the details of such agreements may vary across time and across exchanges.

the penalties imposed on DMMs through fees, rebates, and market-making requirements.[2] Exchanges affect the competitive nature of the DMM role through the requirements they impose on DMMs, for example, by the number of stocks (existing) participants are required to make markets, the constraints they impose on potential new entrants, and any other competitive dimension under which they operate. For instance, contract terms may assign only one or many DMMs to a particular stock or restrict the number of stocks in which an individual DMM can operate.

In this spirit, we exploit a change in the exchange's competitive environment that creates a different playing field for DMMs who were previously present in the market but who were not competing to provide liquidity to the same set of stocks. *Ex ante*, changing the playing field for traders does not guarantee that market liquidity will necessarily improve. Indeed, if the new competitive structure becomes too expensive for DMMs (and thus forces DMMs to exit) or is simply not effective (i.e., does not change the actual level of competition between them), then one may observe no change in market liquidity at all or even a decrease in market liquidity.

Exchanges not only impose various obligations ("sticks") but also grant advantages ("carrots") to DMMs. Thus, the typical market-making contract includes two aspects related to incentives. First, as compensation for their duties, DMMs enjoy a preferential maker/taker fee structure. For example, traders pay a reduced fee when they execute an aggressive order (consume liquidity) and receive a rebate when they execute a passive order (provide liquidity). Second, DMMs agree to fulfill specific requirements, such as the obligation to the exchange to be present in each assigned security for a minimum period of time at the best bid-offer level, to quote or execute a minimum amount of shares, etc. In this paper, we isolate the effects of each such aspect of the contract design on market liquidity: competition among DMMs and incentives offered, both positive and negative.

[2]Clearly, the level of competition that prevails in the market is also determined by the actions of other traders, besides DMMs, whose actions may be indirectly influenced by the exchanges.

To analyze how different types of incentives influence the behavior of DMMs, we use a detailed data set from the NYSE Euronext Paris stock exchange on the Cotation Assistée en Continu (CAC40) index constituents (the main French stock market index), which includes a flag that identifies HFTs and another flag that identifies market-making activities.

The identification strategy used in the paper relies on two events included in our sample period (which spans the period from April 1, 2013, until December 31, 2013). First, on June 3, 2013, the NYSE Euronext Paris implemented several changes to the rules of its so-called "Supplementary Liquidity Provider" (SLP) program, which originally was introduced in 2011. Specifically, the new SLP rules increase the rebate that DMMs receive for passive execution, tighten the requirements that they have to fulfill, and increase competition by leveling the playing field, that is, changing the set of stocks for which they were required to provide liquidity. Second, on November 1, 2013, the NYSE Euronext Paris reversed the rebate that DMMs would receive for passive execution to the pre-June level. Fig. 1 illustrates the timeline for these changes.

These changes included some heterogeneity across stocks in the extent to which there is a change in the competition among DMMs. We use the rebate reversal event to isolate the effect of the carrots, that is, how incentives affect the behavior of DMMs, while exploiting the heterogeneity in the changes in competition among DMMs across stocks to distinguish between the effects of the two sticks, that is, penalties (negative incentives) and competition itself. In particular, we are able to capture the effect of competition because the new SLP rules caused a heterogeneous increase in the number of DMMs present in each stock. To establish the causal effects of DMMs' incentives and competition among DMMs on market liquidity, we employ a difference-in-differences methodology and assign CAC40 index constituents as the treatment group and Deutscher Aktienindex (DAX30) constituents (the main German stock market index) as the control group. We also consider an alternative counterfactual involving other stocks listed on the NYSE Euronext Paris that are not part of the SLP program.

INSERT FIGURE 1 HERE

Our main findings can be summarized as follows. First, an exogenous increase in competition among DMMs is beneficial for market liquidity, both in statistical and in economic terms. In particular, we document a 6.7% (6.4%) decrease in the quoted (effective) spread due to the pure effect of increased competition among market makers. Moreover, this decrease in transaction costs is not only concentrated on HFTs but also spills over to other traders, particularly the NONHFT group. Second, the main driver of improved liquidity is a decrease in realized spreads (the revenue of liquidity providers, net of adverse selection costs). Third, small changes in rebates for DMMs (of approximately 1% of the market-wide quoted spread) and small changes in requirements do not have a statistically and economically significant effect on market liquidity, as measured by quoted and effective spreads. The results from the change in the exchange's competitive environment are non-trivial: if the new structure were too loose and ineffective, DMMs could just pocket the rebate and quote the same spread like any voluntary liquidity provider could do. However, in the presence of competitors, DMMs are willing to undercut each other's quotes, up to the size of the rebate received.

We also show that a reduction in transaction costs is not due to the exogenous change in competition among HFTs (as competition among HFTs remained unchanged) or due to the entry of new players into the market, but rather due to exogenous changes in competition among DMMs *enforced* by the exchange. The latter aspect is extremely relevant because, in our framework, competition does not arise endogenously as an optimal choice made by DMMs (as in classical models of competition), but the exchange forces it on the market. Therefore, whether market liquidity improves or deteriorates is largely an empirical question. We argue that the mere threat of new players entering the market (i.e., new voluntarily liquidity providers) does not improve market liquidity, but rather the new rules imposed by the exchange force current DMMs to compete with each other to make markets in the same

set of stocks.

The remainder of this paper proceeds as follows. Section 2 contextualizes our paper within the literature on DMMs and HFTs. Section 3 provides the relevant institutional details about the NYSE Euronext Paris, in particular changes in the competitive structure, and incentives, both fee/rebates and requirements, and develops testable hypotheses. Section 4 describes the methodology and data used in the paper. Section 6 presents the empirical evidence. Section 7 presents robustness checks. Section 8 concludes.

2 Literature review

Our first contribution to the literature relates to the role of competition among DMMs. Remarkably, the empirical literature largely neglects the issue of competition *among* DMMs, even though competition in a broad sense is mentioned in a few theoretical models. Although a couple of the extant models explicitly allow for different degrees of competition among market makers (Biais, Martimort, and Rochet (2000); Aït-Sahalia and Sağlam (2017)), others often assume that the market making business is fully competitive.

The conventional wisdom in modern markets is that one can safely assume that DMMs face enough competition from voluntary liquidity providers; therefore, it is sufficient to assign one DMM per stock. However, Anand and Venkataraman (2016) show that voluntary liquidity providers tend to synchronously withdraw from the market when market conditions are unfavorable, thus leaving the burden of liquidity provision solely to DMMs. This evidence reinforces the importance of investigating competition *among* DMMs, not overall competition among liquidity providers (both voluntary and otherwise). Moreover, it should be emphasized that the two groups play different roles in the market. In this paper, we provide evidence that competition among DMMs for the same stock constitutes an important aspect of the contract design that exchanges ought to consider when introducing solutions to improve market liquidity. To the best of our knowledge, we are the first to analyze competition

among DMMs in a limit order book market (rather than competition *between trading venues* or competition *among traders* through a speed advantage or competition *among dealers* in over-the-counter (OTC) markets) in an empirical setting.

Our paper is the first to study the *relative* importance of the different aspects of contract design between DMMs and exchanges and to distinguish between positive and negative incentives. Although several studies probe the role of maker/taker fees in incentivizing DMMs to provide liquidity (e.g., Colliard and Foucault (2012); Malinova and Park (2015); Clapham, Gomber, Lausen, and Panz (2017), Cardella, Hao, and Kalcheva (2017); Black (2018); El Euch, Mastrolia, Rosenbaum, and Touzi (2018); Lin, Swan, and Harris (2018)), most of these studies zero in on the case in which maker/taker fees are uniformly applied to all market participants across all stocks, rather than specifically to DMMs to incentivize their liquidity provision. In a closely related recent paper on this issue, Bessembinder, Hao, and Zheng (2019) study the effect of making/taking fees specific to DMMs and the requirements of DMMs. However, these two aspects were simultaneously analyzed, and, thus, drawing conclusions about their *relative* effectiveness in optimally motivating DMMs to improve their liquidity provision is not possible. In contrast to the empirical setting of Bessembinder, Hao, and Zheng (2019), ours is unique in that we are able to distinguish between the role of carrots (rebates) and sticks (competition and requirements). In doing so, we exploit the impact of a policy change that had a differential impact across stocks.

Our second contribution to the literature is to provide evidence on the importance of DMMs for market liquidity in an era of high-frequency trading. Over the past decade, technological innovation, faster computers with sophisticated execution algorithms, and new trading platforms have completely transformed the global landscape of equity trading. A new class of electronic liquidity providers has emerged; the "old" class of specialists has almost disappeared, leaving room for a "modern" version of DMMs, who make extensive use of co-location facilities, high-speed connections, and fast computers.[3] In other words,

[3]Hasbrouck and Sofianos (1993) describe the role of the specialist on the NYSE; Venkataraman and

modern market making is firmly in the hands of HFTs.[4] Clark-Joseph, Ye, and Zi (2017) and Bessembinder, Hao, and Zheng (2019) document the role of DMMs in the era of HFT in liquidity provision. Both papers provide causal evidence that the activities of DMMs have a positive effect on market liquidity.[5] We contribute to this literature not only by pointing out the importance of DMMs for market liquidity but also by emphasizing the importance of their business organization and their response to incentives for market liquidity.

Our third contribution is made to the stream of the literature on competition among HFTs. Baron, Brogaard, Hagströmer, and Kirilenko (2019) show that HFTs compete with the fastest trader on speed and secure the largest profit. On account of this relative speed advantage, the HFT industry does not typically witness a deterioration in profits through time. Shkilko and Sokolov (2019) show that when speed differentials become less prominent, liquidity improves. Brogaard and Garriott (2019) study the entry of new HFTs into the market and show that HFTs are quantity competitors (as modeled by Biais, Martimort, and Rochet (2000)), rather than price competitors (as modeled by Budish, Cramton, and Shim (2015) and Menkveld and Zoican (2017)). We contribute to this stream of the literature by studying the effect of HFTs who switch roles (from proprietary traders to DMMs), while keeping constant the level of competition among HFTs, as well as their relative speed differentials. This approach allows us to complement the previous literature looking at competition among HFTs, in general.

Competition among HFTs is conceptually different from that of HFTs who act as DMMs.

Waisburd (2007) provide a historical overview of the "animateurs" in the French stock market.

[4]See Hagströmer and Norden (2013), Menkveld (2013), Budish, Cramton, and Shim (2015), Bongaerts and Van Achter (2016), and Menkveld and Zoican (2017) for both theoretical and empirical evidence of HFTs taking on the role of *de facto* market makers. Anecdotal evidence also confirms this view, for example, on the NYSE, since January 2016, the DMMs' duties are all managed by HFT firms (see "High-frequency traders in charge at NYSE," *Financial Times*, January 26, 2016).

[5]Other evidence for the value of DMMs is largely based on voluntarily negotiated contracts between the DMM and the firm itself (see, e.g., Venkataraman and Waisburd (2007); Anand, Tanggaard, and Weaver (2009); Menkveld and Wang (2013); Skjeltorp and Ødegaard (2014); Bessembinder, Hao, and Zheng (2015)). However, these studies are likely to provide an upward-biased estimate of the DMM's value, as only firms that find hiring a DMM beneficial will do so.

In general, HFTs might voluntarily choose to be market makers, but they do not receive any special treatment, nor due they have any obligations, for their market-making activities that might influence their behavior, either as carrots or as sticks, whereas DMMs do. Hence, our unique approach allows us to focus on how competition among HFTs who perform the role of DMMs (who have a competitive advantage over other HFTs because of the special rebates for passive execution) influences market quality. In particular, we shed light on whether competition among DMMs induces a pass-through of the rebates for passive execution from DMMs themselves to the overall market in a potential reduction in transaction costs. Furthermore, we investigate the effect of the exchange *forcing* competition, rather than the effect of competition arising endogenously (e.g., through eliminating barriers to entry, which might affect market liquidity). This singular approach speaks to the novelty of our investigation, since the outcome of the forced increase of competition is neither trivial nor predictable; hence, the evidence revealed by our analysis should be of interest to policy makers.

Our fourth and final contribution is made to the somewhat-dated market microstructure literature, which studies competition between dealers and highlights OTC markets or other quote-driven markets. Benston and Hagerman (1974) and Stoll (1978) study the relation between market spreads and the number of dealers in an OTC market. Their main finding is that these spreads decrease in the number of dealers. However, neither of these papers demonstrates a causal relationship between the increase in the number of dealers and the spread, since the decision about which and how many stocks to participate in is an endogenous one made by individual dealers. In particular, Benston and Hagerman (1974) note that the number of dealers active in a stock depends on the size of the stock, a measure of its importance, whereas Stoll (1978) documents that the number of dealers depends on the riskiness of the stock and its trading activity. However, Christie and Schultz (1994) suggest that the number of dealers may not be a good proxy for competition and document possible evidence of collusion among dealers at NASDAQ since the spread they quote is too high. In

the face of possible collusion, the number of dealers may be a poor proxy for the degree of competition.

We add to this stream of literature in two primary ways. First, we study the limit order book market, which differs in market structure from an OTC market or a dealer market (e.g., NASDAQ in the past). Unlike DMMs in limit order book markets, dealers in OTC markets are not obligated to transact at the specified quoted price (rather their quotes represent a general willingness to trade, which they could implement in conjunction with price discrimination). Second, they do not face competition from voluntarily liquidity providers, and their activity is not anonymous. Overall, these factors prevent DMMs from colluding with each other; thus, an increase in the number of DMMs could be viewed as an increase in competition in our setting. In sum, we add to this stream of literature by studying the effect of a forced and exogenous increase in competition among DMMs on market liquidity in a limit order book market setting.

3 Institutional details and hypothesis development

Our analysis is based on a natural experiment at the NYSE Euronext Paris, the leading stock market in France, following certain changes to the market-making regime under which DMMs provide liquidity to blue-chip stocks. The NYSE Euronext Paris is an order-driven market with an open limit order book. Therefore, any market participant can, in principle, act as a *de facto* liquidity provider by submitting limit orders to the market. However, in 2011, the NYSE Euronext Paris introduced the Supplementary Liquidity Provider (SLP) program to license DMMs and thereby enhance liquidity provision for blue-chip stocks. The Flash News of January 13, 2011 (NYSE-Euronext (2011)), covers the details of the program's implementation.[6] According to The Financial Times (2011), seven firms initially joined the

[6]Because of the many changes in the ownership of the NYSE Euronext Paris, as well as the website of the NYSE Euronext Paris, which occurred in recent years, some earlier documents are not easy to find. Therefore, we provide all the relevant SLP documents at the end of the Internet Appendix.

program and became DMMs. In the remainder of this paper, we refer to SLP members as DMMs. In the next subsections, we discuss the sticks (competition and requirements) and carrots (rebates) that the NYSE Euronext Paris employs to incentivize DMMs. We center our analysis (and the related SLP program discussion) on CAC40 index constituents (the main French stock market index).

3.1 SLP program: Competition and requirements

The 2012 SLP program requires that each firm appointed as a DMM must (NYSE-Euronext (2011)):

A) Commit to be present in at least one basket of stocks (CAC40 stocks are partitioned into *four* baskets). [Competition]

B) Satisfy the following three rules [Requirements]:

   (1) "Be present at least 95% of the time on both sides of the market during the continuous trading session;"

   (2) "Display a minimum volume of at least EUR 5,000 at the best limit price on average across all stocks included in the basket."

   (3) "Deliver the presence time committed to by the applicant during the tender process at the Euronext best limit for each assigned basket of securities, with a minimum of 10% per each security included in the basket."

In the Flash News of May 9, 2013 (NYSE-Euronext (2013b)), the exchange announced several new changes to the SLP program that would come into effect as of June 3, 2013. The main differences pertained to basket composition (Rule A) and the proportion of trading time present at the best limit (Rule B3). CAC40 stocks were initially split into four different baskets, but starting on June 3, 2013, all of the CAC40 components would be placed in

the same basket.[7] This change increased the number of DMMs present in each stock in the CAC40 index, since all of them were obliged to remain active in *all* CAC40 index constituents. This change in basket composition would increase competition among DMMs (beyond the entry of one new DMM into the SLP program).

According to the Autorité des Marchés Financiers (AMF), the French Stock market regulator, seven DMMs were present as CAC40 index constituents in April and May 2013. Moreover, these seven DMMs were *not* uniformly present across baskets in April and May 2013. After the new SLP rules were implemented, these seven DMMs were present in *all* CAC40 index constituents, and one new DMM joined the SLP program.[8]

Fig. 2 shows the increased number of DMMs present in each basket of stocks after the new SLP rules were implemented: from five to eight, from six to eight, from five to eight, and from seven to eight in baskets 1 to 4, respectively. We note that the change in competition was the only change to affect the stocks in a heterogeneous way due to the different number of DMMs present in each basket of stocks before the implementation of the new SLP rules.[9]

INSERT FIGURE 2 HERE

The key characteristics of the new 2013 SLP contract are (NYSE-Euronext (2013b)):

A) Commit to be present in all stocks that belong to CAC40. [Competition]

B) Amendments to rule n. (3) [Requirements]:

(3.1) "Minimum passive execution level of 0.70% in percentages of the aggregate monthly volume traded on Chi-X, BATs, Turquoise, and NYSE Euronext,"

[7] Table A1 in the appendix details the basket composition for CAC40 index constituents.

[8] Megarbane, Saliba, Lehalle, and Rosenbaum (2017) use the same database enhanced with trader ID numbers to identify 13 firms as SLP members for the sample period from November 2015 until July 2016.

[9] We argue that traders who were part of the SLP program were present across all CAC40 stocks before the new rules were implemented. However, in some baskets of stocks they acted as DMMs, while in other baskets of stocks they acted as proprietary traders. We refer readers to Section 6.2 for details.

(3.2) "Minimum presence time of 25% at the NYSE Euronext best limit for each assigned basket, weight-averaged over the entire CAC40 basket and the calendar month,"

(3.3) "Minimum passive execution level of 0.10% and a minimum presence time of 10% at the NYSE Euronext best limit of the continuous trading session for each security, weight-averaged over the calendar month."

Thus, in June 2013, the overall market environment for DMMs changed in two ways: (1) increased competition between DMMs through changes in the basket composition and the entry of new market makers into the SLP program and (2) tightened requirements, in particular, for the time presence at the best bid-offer level, for DMMs.

3.2 SLP program: Benefits

The NYSE Euronext Paris initially provided the following maker/taker scheme for SLP members: for each executed market order (consuming liquidity), the fee for SLP members would be 0.30 bps, and, for each executed limit order (providing liquidity), the rebate for SLP members would be -0.20 bps, until May 2013, which increased to -0.22 bps as of June 3, 2013. However, the Flash News of October 1, 2013 (NYSE-Euronext (2013a)), announced that the rebate would revert to -0.20 bps as of November 1, 2013. This attractive maker/taker fee structure only applied to those SLP members who fulfilled the exchange requirements. SLP members who did not fulfill the requirements were charged 0.55 bps per order execution, independent of whether they consumed or provided liquidity. We note that although the rebate may seem small in absolute magnitude, it amounts to 9.9% and 11.5% of the average quoted spread in the pre- and post-SLP periods, respectively.

3.3 Hypotheses

The institutional setting, in particular, for the contract changes, suggests some clear implications for our empirical investigation. We first summarize these implications, which will then be used to motivate the concrete hypotheses that we will subsequently test.

First, changes to Rule A create a backdrop for studying changes to the competitive market making environment, but the presence requirement in and of itself does not lead to a quantitative prescription. However, when interpreted along with Rule B3, modified by Rule B3.3, it became a binding requirement for DMMs, since these rules prescribed a 10% *minimum* presence at the best quotes for *each* security. According to the revised Rule A, the number of stocks for which such a minimum market-making presence was needed to be maintained increased from 10 to 40 stocks, which indicates that competition increased by allowing more players to participate in each stock. This, in turn, may have led to an improvement in market liquidity. However, the increase in the number of stocks in which a minimum presence was required may have, at the same time, stretched the resources of DMMs, whose inventory and computational capacity, and hence their ability to provide liquidity, had to be allocated across more stocks (tightened requirements). This may, therefore, have led to the unintended consequence of the opposite result, that is, a deterioration in market liquidity.[10] Therefore, we stress that the type of change in competition we investigate arises from the rules imposed by the exchange: each DMM has to be present in all CAC40 stocks, a requirement dictating that the number of DMMs present in some sets of stocks almost double. Importantly, the change in competition is *not* driven by a reduction in the barriers to entry (i.e., the change does not significantly affect the number of firms playing the role of DMM in the market as a whole).

Second, Rule B1, Rule B2, and the newly introduced Rule B3.2 were not binding for DMMs in the pre-SLP period and, thus, should not have prompted a change in market

[10] We refer to Section IA 1 in the Internet Appendix for a detailed discussion of the reallocation of DMMs' capacity across baskets of stocks and its effect on market liquidity.

liquidity after the new SLP rules were in place (see Section 7.4).[11] Finally, the change in the maker/taker fee structure is small in absolute terms. Besides, the rebate increase (as of June 3, 2013) was shortly followed by a reversal (as of November 1, 2013). This suggests that changes in the maker/taker fee structure may have had only a marginal impact, which we verify in Section 7.6.

Overall, we conclude that only Rule A, combined with Rule B3.3, is likely to have affected market liquidity. Hence, the above empirical implications for market liquidity can be tested through the following formal null hypothesis and its alternative:

Hypothesis 1. *A forced increase in competition between DMMs may improve market liquidity due to a larger number of market makers maintaining a minimum presence in each stock.*

Hypothesis 2. *A forced increase in competition between DMMs may cause market liquidity to deteriorate due to the limited risk-bearing capacity of market makers.*

We aim to disentangle the conflicting effects of these two hypotheses.

4 Data and summary statistics

We use two natural experiments based on changes that affect different aspects of the contract between the exchange and DMMs (we refer readers to Fig. 1 for the timeline of events accompanying these changes). The first event is the changes in the SLP program that became effective as of June 3, 2013, and includes (a) increased competition between DMMs; (b) more stringent requirements; and (c) increased rebates for liquidity provision by DMMs. The second change is the rebate reversal to the pre-June level that went into effect as of November 1, 2013. We examine the effect of competition among DMMs and the incentives of DMMs on market liquidity in a difference-in-differences setting.

[11] We acknowledge that we cannot distinguish between the behaviors of each individual DMM; therefore, we base our conclusions on average group behavior.

In the following sections, we describe the treatment and control groups used for our analysis, define the market liquidity variables, and present our summary statistics.

4.1 Treatment group: Data description

We direct our attention to CAC40 index constituents (the main French stock market index). Our database is obtained from the Base Européenne de Données Financières à Haute Fréquence (BEDOFIH) and is based on data from the NYSE Euronext Paris. We concentrate our analysis on 36 stocks that belong to the CAC40 Index.[12] The BEDOFIH database provides time-stamped quotes and trades (in microseconds) covering the complete history of each order.

The 2012 SLP program (NYSE-Euronext (2012)) covers 90 stocks that are split into six baskets (15 stocks in each basket). Baskets 1 to 4 predominantly comprise French stocks, and baskets 5 and 6 comprise non-French ones. The BEDOFIH database includes only French stocks that have the NYSE Euronext Paris as their main trading venue: therefore, our database contains only data for baskets 1 to 4 (see the appendix for basket composition details). These baskets largely comprise CAC40 index constituents and CAC20Next index constituents (the next tier consists of the main candidates considered for inclusion in CAC40). The BEDOFIH database includes 52 SLP stocks, 36 which are CAC40 index constituents and 15 which are CAC20Next index constituents (the next tier). Given that stock market liquidity, which constitutes the main dependent variable of our analysis, is strongly related to size, we focus on CAC40 index constituents to avoid the possibility that our results may be driven by the smallest and, thus, most illiquid stocks in the SLP program.

Data from NYSE Euronext Paris are complemented by a flag provided by the AMF that classifies each trader into one of three groups: HFT, MIX, and NONHFT. HFT are pure-play HFT companies (e.g., Getco, Virtu), and the MIX group covers investment banks and large

[12] Four component stocks of the CAC40 are not included in the database, since their main trading venue is not the NYSE Euronext Paris: ArcelorMittal, Gemalto, Solvay, and Unibail-Rodamco.

brokers, which could have substantial HFT activities (e.g., BNP Paribas, Goldman Sachs). The remaining companies are placed in the NONHFT category. This classification is revised annually, and the three trader groups are mutually exclusive (see AMF (2017) for a detailed description of the methodology undergirding this classification).

The NYSE Euronext Paris also provides information about the account type used to submit each order. For the purpose of our analysis, we distinguish between two account types: the market-making account (MM) and the other account (OTHER). The exchange confirms that the orders flagged for liquidity provision purposes are strictly monitored and verified by the exchange's compliance department. Fig. 3 depicts a schematic diagram of the trader account types we analyze. Section IA 2 in the Internet Appendix summarizes the traders' characteristics (for CAC40 stocks as well as for the 36 largest non-SLP stocks).

INSERT FIGURE 3 HERE

4.2 Control group: Data description

In our main analysis, stocks that belong to the DAX30 (the main German stock market index) compose our control group. The average market capitalization, trading volume, and inverse of the stock price, which captures the impact of a potentially binding tick size,[13] of DAX30 index constituents are comparable, both in economic and statistical terms, to those of CAC40 index constituents as of February 2013 (see Panel A of Table 1). In particular, the average market capitalization of CAC40 (DAX30) stocks is EUR 26.058 (26.447) billion; the average daily trading volume of CAC40 (DAX30) stocks is EUR 2.771 (4.679) billion; and the inverse of the stock price of CAC40 (DAX30) stocks is 0.041 (0.035). None of the differences is significant at the conventional significance levels of 10%, 5%, and 1%.

[13]The tick size on the NYSE Euronext Paris and Xetra depends on the stock price. If the stock price is below EUR 10, then the tick size is 1/1,000; if the stock price is between EUR 10 and EUR 50, then the tick size is 5/1,000; if the stock price is between EUR 50 and EUR 100, then the tick size is 1/100; and if the stock price is above EUR 100, then the tick size is 5/100. Therefore, controlling for the inverse of closing price is equivalent to controlling for tick size.

We obtain data on trades and the best bid-offer quotes for DAX30 index constituents from the Thomson Reuters Tick History (TRTH) database and time-stamped data at the millisecond level from Xetra. We note that the data provided by TRTH are much less granular than those provided by BEDOFIH, in that the former does not distinguish between different trader types.

INSERT TABLE 1 HERE

We also examine whether non-SLP stocks available in the BEDOFIH database might serve as a reasonable control group for CAC40 stocks. In particular, we look at the 36 largest non-SLP stocks as of February 2013, that is, the non-SLP stocks most similar to the CAC40 stocks. However, non-SLP stocks have an average market capitalization of EUR 9.742 billion, as opposed to EUR 26.058 billion for CAC40 stocks, and an average trading volume of EUR 0.194 million, as opposed to EUR 2.771 billion for CAC40 stocks (see Panel B of Table 1). We note that these differences in market capitalization and trading volume are statistically significant at the 1% level. Given that market liquidity is strongly related to company size and trading volume, we conclude that non-SLP stocks are not necessarily the most suitable control group for the purpose of our analysis. Section IA 2 in the Internet Appendix also shows that CAC40 stocks and non-SLP stocks have a very different composition of trader types: in particular, HFT-MM and MIX-MM are not present in non-SLP stocks. We also identify non-negligible chances of spillover effects as result of the implementation of the new SLP rules to non-SLP stocks. Nevertheless, given the lack of other suitable alternatives in the French context, we conduct the robustness checks with non-SLP stocks used as a control group in Section 7.5.

4.3 Market liquidity variables

In the spirit of several papers in the literature, we measure market liquidity by quoted and effective half-spreads, in which the quoted spread measures the round-trip quoted cost

of one share transaction, whereas the effective spread measures the round-trip cost of an actual transaction. Both spreads are computed at the time of the tth trade:

$$Quoted\ Spread_t = \frac{(Ask_t - Bid_t)}{2 * Midpoint_t}, \tag{1}$$

$$Effective\ Spread_t = \frac{|P_t - Midpoint_t|}{Midpoint_t}. \tag{2}$$

In the robustness section (see Section 7.1), we decompose the effective spreads into realized spreads (revenue for the liquidity provider, net of adverse selection costs) and price impact (adverse selection costs). We set q_t equal to one for a buyer-initiated trade and equal to -1 for a seller-initiated trade, and h denotes the decomposition horizon in seconds and minutes:

$$Realized\ Spread_t = \frac{q_t * (P_t - Midpoint_{t+h})}{Midpoint_t}, \tag{3}$$

$$Price\ Impact_t = \frac{q_t * (Midpoint_{t+h} - Midpoint_t)}{Midpoint_t}. \tag{4}$$

We compute the liquidity variables for each trade in our sample and winsorize them at the 95% level, that is, at 2.5% and 97.5%, for each stock j. Then we compute the share-weighted average of these variables for each stock j, day d, and trader account type k. We again winsorize them at the 95% level across all stock-days for each trader account type.

5 Identification strategy

We start by examining our first natural experiment: the implementation of the new SLP rules on June 3, 2013. We direct our attention to the two months surrounding the implementation date of the new SLP rules (from April 1, 2013, until July 31, 2013).

We first distinguish between competition among fast traders, in general (HFT and MIX) versus competition among DMMs (HFT-MM and MIX-MM), in particular. Following Brogaard and Garriott (2019), we examine whether, following the implementation of the new

SLP rules, the market share of fast traders increases. We measure the HFT market share, $Market\ share_{j,d}^{HFT}$, as the ratio of messages, trades, and trading volume stemming from fast traders relative to the total amount of messages, trades, and trading volume for stock j on day d.

We repeat a similar analysis for competition among DMMs by examining whether, following the implementation of the new SLP rules, the market share of DMMs increases. We measure the DMM market share, $Market\ share_{j,d}^{DMM}$, as the ratio of messages, trades, and trading volume stemming from DMMs relative to the number of messages, trades, and trading volume arising from fast traders for stock j on day d. Unfortunately, because of data limitations, the market share of fast traders and DMMs can be estimated for CAC40 stocks only (as the BEDOFIH database provides the relevant identification flags, whereas the TRTH database does not).

To test whether competition among fast traders and competition among DMMs increases following the change in the market structure, we perform the following regression:

$$Market\ share_{j,d}^{k} = \alpha_j + \beta_1 SLP_d + \Gamma Controls + \epsilon_{j,d}, \tag{5}$$

where k corresponds to either all fast traders (HFT and MIX) in the market or DMMs, respectively, SLP_d is a dummy variable which is equal to one, in the post-event period (from June 3, 2013, until July 31, 2013), and zero, in the pre-event period (from April 1, 2013, until June 3, 2013), and $Controls$ is a matrix of control variables that includes stock and market volatilities, market capitalization, and the inverse of the stock price. We estimate all our regressions with stock fixed effects to capture differences in stock characteristics across baskets and cluster standard errors by stock and day. To test for differential effects of the change in competition across the four baskets of stocks as defined in the pre-SLP period (see the appendix for basket composition details), we perform the following analysis:

$$Market\ share_{j,d}^{k} = \alpha_j + \beta_1 SLP_d + \boldsymbol{\gamma} \times \boldsymbol{Basket_j} \times SLP_d + \Gamma Controls + \epsilon_{j,d}, \tag{6}$$

where $\boldsymbol{\gamma}$ is a vector of coefficients, $\boldsymbol{Basket_j} = \begin{pmatrix} Basket1_j \\ Basket2_j \\ Basket3_j \end{pmatrix}$; and $Basket1_j$, $Basket2_j$, and $Basket3_j$ are dummy variables equal to one if the stock belongs to baskets 1, 2, or 3, respectively, and zero otherwise (we use basket 4 are the reference). Having established an increase in competition among DMMs (and not among fast traders), we next investigate whether the change in competition affected the liquidity measures we described above.

We first perform a difference-in-differences analysis for the different liquidity measures, where we assign the DAX30 stocks to the control group in the main analysis and employ the non-SLP stocks for robustness. The analysis explores whether the overall effect of the new SLP rules (i.e., competition, requirements and rebates) encapsulated market liquidity. We regress the different liquidity measures on the dummy variable, SLP_d, described above, the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to CAC40 index, and zero otherwise, and the interaction term between $CAC40_j$ and SLP_d. We control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price.[14] We estimate the specifications without fixed effects, with stock fixed effects, and with both stock and day fixed effects. We also cluster standard errors by stock and day. Formally, we perform the following regression:

$$Liquidity_{j,d} = \alpha + \beta_1 SLP_d + \beta_2 CAC40_j + \beta_3 SLP_d \times CAC40_j + \Gamma Controls + \epsilon_{j,d}. \quad (7)$$

Further, we exploit the heterogeneity across baskets to nail down the pure effect of increased competition among DMMs. More formally:

[14] We note that trading volume itself may be affected by the new SLP rules and, thus, may be endogenous. Therefore, we repeat our main analysis but drop trading volume from the list of the control variables. We also repeat our main analysis using the share of trading volume executed on the NYSE Euronext Paris alone as a control variable instead of trading volume. Our findings remain unchanged qualitatively. Section IA 3 in the Internet Appendix presents the results of these alternative specifications.

$$\begin{aligned} Liquidity_{j,d} =& \alpha + \beta_1 SLP_d + \beta_2 CAC40_j + \beta_3 SLP_d \times CAC40_j + \boldsymbol{\gamma} \times \boldsymbol{Basket_j} + \\ &+ \boldsymbol{\phi} \times SLP_d \times CAC40_j \times \boldsymbol{Basket_j} + \Gamma Controls + \epsilon_{j,d}, \end{aligned} \tag{8}$$

where $\boldsymbol{\gamma}$ is a vector of coefficients, $\boldsymbol{Basket_j} = \begin{pmatrix} Basket1_j \\ Basket2_j \\ Basket3_j \end{pmatrix}$; $\boldsymbol{\phi}$ is a vector of coefficients, $SLP_d \times CAC40_j \times \boldsymbol{Basket_j} = \begin{pmatrix} SLP_d \times CAC40_j \times Basket1_j \\ SLP_d \times CAC40_j \times Basket2_j \\ SLP_d \times CAC40_j \times Basket3_j \end{pmatrix}$; and $Basket1_j$, $Basket2_j$, and $Basket3_j$ are dummy variables equal to one, if the stock belongs to baskets 1, 2, and 3, respectively (we use basket 4 are the reference), and zero otherwise.[15] In all our regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. We estimate all specifications without fixed effects, with stock fixed effects, and with both stock and day fixed effects. In all of our regressions, we cluster the standard errors by stock and day.

We use the estimation results from Eq. (8) to disentangle the effect of changes in other incentives due to the new SLP rules from the pure effect of competition among DMMs by exploiting the heterogeneity in the change of competition among the different baskets. $\beta_3 + \boldsymbol{\phi}$ represents the overall effect of the implementation of the new SLP rules. $\boldsymbol{\phi}$ represents the heterogeneous effects of the new SLP rules across baskets of stocks due to the differences in the changes in competition among DMMs, and β_3 represents the effect of changes in other incentives due to the implementation of the new SLP rules for market liquidity. Therefore, the coefficient we are most interested in for testing Hypotheses 1 and 2 is $\boldsymbol{\phi}$, that is, the coefficient that captures whether, for the various baskets of stocks, the new SLP rules increase

[15] We note that all stocks that belong to basket 1, 2, or 3 also belong to the CAC40 index. Consequently, the interaction term $SLP_d \times Basket1_j$ is exactly the same as the interaction term $SLP_d \times CAC40_j \times Basket1_j$ and is, therefore, omitted from the estimation because of multicollinearity. The same consideration applies to the interaction terms with $Basket2_j$ and $Basket3_j$.

competition and whether market liquidity improves as a consequence.

In the robustness section, we also analyze the rebate reversal that took place on November 1, 2013, to ensure that small changes in rebates do not affect the behavior of DMMs (see Section 7.6). We focus our attention on the two months surrounding the rebate reversal date (from September 1, 2013, until December 31, 2013). We regress the different liquidity measures on the dummy variable, $Rebate_d$, which is equal to one, in the post-event period (from November 1, 2013, until December 31, 2013), and zero, in the pre-event period (from September 1, 2013, until October 31, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to CAC40 index, and zero otherwise, and on the interaction term between $CAC40_j$ and $Rebate_d$. As mentioned previously, in all regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. We estimate the specifications without fixed effects, with stock fixed effects, and with both stock and day fixed effects. Again, in all our regressions, we cluster standard errors by stock and by day. More formally, we perform the following regression:

$$Liquidity_{j,d} = \alpha + \delta_1 Rebate_d + \delta_2 CAC40_j + \delta_3 Rebate_d \times CAC40_j + \Gamma Controls + \epsilon_{j,d}. \quad (9)$$

We use the results of Eq. (9) to quantify the effect of the rebate change (if any) that occurred on June 3, 2013, when the new SLP rules were implemented. In particular, if we observe a statistically significant δ_3, we adjust the effect of new SLP rules by $-\delta_3$.

6 Empirical results

In this section, we present our empirical results for the relative importance of incentivizing DMMs, versus competition among DMMs, to provide market liquidity. To do this, we conduct a natural experiment on the NYSE Paris Euronext, following the implementation of the new SLP rules. First, we provide summary statistics of our sample (see Section 6.1).

Second, we demonstrate that the competition we are investigating differs from that studied in previous work (see Section 6.2). Last, we empirically analyze the relative importance of incentivizing DMMs versus competition among DMMs to provide market liquidity. We show that an increase in competition induces a pass-through effect on the rebate DMMs receive from the exchange to other market participants, in lower spreads (see Section 6.3).

6.1 Summary statistics

Table 2 presents the summary statistics for our sample period for CAC40 and DAX30 index constituents. We focus our attention on the two months before (the pre-SLP period, Panel A) and the two months after (the post-SLP period, Panel B) the implementation date of the new SLP rules – June 3, 2013.[16]

INSERT TABLE 2 HERE

In particular, we provide evidence on the marketwide quoted and effective spreads for the market for both CAC40 and DAX30 index constituents, averaged across stock-days. For example, during the pre-SLP period, the marketwide quoted (effective) spread of CAC40 index constituents is equal to 2.02 (2.09) bps, with the corresponding number equaling 2.07 (2.51) bps for DAX30 index constituents. However, in the post-SLP period, the quoted and effective spreads for CAC40 and DAX30 clearly deviate from each other. In particular, in the post-SLP period, the quoted (effective) spread for the CAC40 is equal to 1.92 (1.99) bps, whereas that for the DAX30 is equal to 2.15 (2.59) bps.

Panel C of Table 2 reports the results of the univariate t-tests for the pre- and post-SLP mean comparison. The tests confirm that, for CAC40 index constituents, market liquidity significantly improves in the post-SLP period, compared to the pre-SLP period, whereas, for DAX30 index constituents, market liquidity significantly deteriorates. This divergence

[16]Section IA 4 in the Internet Appendix provides summary statistics for market liquidity for each basket of stocks as defined in the pre-SLP period (we refer readers to the appendix for basket composition details).

in the market liquidity results for the treatment and control groups in the post-SLP period constitutes preliminary evidence that the new SLP rules improved stock market liquidity for the French market, relative to the German market.

Then, for CAC40 index constituents, we also provide information on the quoted and effective spreads witnessed for each trader account type while initiating the transaction, averaged across stock-days. In the pre-SLP period, HFT-MM activity faced the smallest quoted and effective spreads of 1.82 bps and 1.83 bps, respectively, while NONHFT traders faced the largest quoted and effective spreads of 2.51 bps and 2.72 bps, respectively. This pattern holds for the post-SLP period, as well.

Fig. 4 graphs the weekly moving average of the residual quoted (Panel A) and effective spreads (Panel B) after controlling for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price during our sample period for CAC40 (solid-black line) and DAX30 index constituents (solid-gray line). The dashed horizontal lines represent the pre-SLP (from April 1, 2013, until June 3, 2013) and post-SLP (from June 3, 2013, until July 31, 2013) averages (for ease of comparison, we subtract the pre-SLP average from both time series). The vertical dashed-dotted lines represent the announcement and implementation dates. Quoted and effective spreads for CAC40 and DAX30 co-move during the pre-SLP period and deviate in the post-SLP period. That the parallel trends assumption is satisfied makes the DAX30 an appropriate control group for analyzing the effect of the new SLP rules on the market liquidity of CAC40 stocks (see Section IA 5 in the Internet Appendix for a discussion of the parallel trends assumption).

INSERT FIGURE 4 HERE

In the following sections, we perform a difference-in-differences analysis to estimate the effect of the new SLP rules on market liquidity and separate the effects that arise from the competition among DMMs from those that stem from changes to other incentives.

6.2 New SLP rules: Competition among fast traders versus competition among DMMs

We begin by providing summary statistics for the pre-SLP and post-SLP periods for the market share of fast traders and their subset of DMMs. Panel A of Table 3 shows that fast traders (HFT and MIX), independent of their role (MM or OTHER), are responsible for 97.1% of all messages (new orders, modification, and cancellation), 82.4% of all trades, and 81.6% of the overall trading volume in the pre-SLP period. Panel A of Table 3 also shows that DMMs are responsible for 72.7% of messages from fast traders, 43.5% of trades from fast traders, and 31.9% of the trading volume arising from fast traders in the pre-SLP period. Panel B of Table 3 reports the respective statistics for the post-SLP period.

INSERT TABLE 3 HERE

According to Brogaard and Garriott (2019), fast traders tend to compete on quantity rather than price; therefore, if the new SLP rules caused new fast traders to enter the CAC40 stocks or a particular basket of stocks, we should observe an increase in the market share of fast traders in the post-SLP period. Panel C of Table 3 reports the difference-in-means tests between the post-SLP and pre-SLP periods for the various measures of market share of fast traders and DMMs, respectively. We note that, although, at the market level, there is a statistically significant increase in the market share of fast traders, the economic magnitude of this increase is negligible, when compared with the increase observed for DMMs.

In fact, we observe significant shifts, both economically and statistically, in the market share of DMMs relative to the activity of fast traders: we observe a 10.15% increase in the share of messages, which is, in relative terms, a 14% increase compared to the pre-SLP level (10.15% divided by 72.7%), a 7.44% increase in the share of trades, which is, in relative terms, a 17% increase compared to the pre-SLP level (7.44% divided by 43.5%), and a 6.39% increase in the share of trading volume, which is, in relative terms, a 20% increase compared

to the pre-SLP level (6.39% divided by 31.9%). Overall, these results provide initial evidence that competition among fast traders remained largely unchanged, while some fast traders moved from the HFT-MIX-OTHER category to the HFT-MM or the MIX-MM category. We also note that the DMMs' market share in the pre-SLP period was the largest for basket 4, whereas in the post-SLP period, DMMs have similar market shares across all baskets, indicating that the largest increase in competition occurs in baskets 1, 2, and 3.

INSERT TABLE 4 HERE

Table 4 presents the results of the market share regression (see Eq. (5)) for CAC40 index constituents. The table controls for stock fixed effects, and standard errors are clustered by stock and by day. Because of data limitations for DAX30 index constituents, we cannot conduct a difference-in-differences analysis of that group. Table 4 shows that the coefficient for the SLP_d dummy variable is positive and significant for the change in competition among fast traders (HFT and MIX). However, the economic magnitude is small at around 2%. Instead, the coefficient for changes in competition among DMMs indicates that their share of messages increases by 10%, and their share of trades and trading volume increases by 8% and 7%, respectively. The results of the estimation confirm the initial intuition from the summary statistics of the market share of fast traders and DMMs that their trading activity would intensify.

These results also confirm that the type of competition we are investigating in this paper is different from that studied by prior papers, for example, Brogaard and Garriott (2019). Thus, we contribute to the literature by documenting the effects of several HFTs changing the role they perform on the market following the implementation of new exchange rules. In particular, we investigate whether increased competition among DMMs induces them to pass through the rebates they receive for passive execution to the market as reduced transaction costs. This is clearly quite different from investigating how the increase in the number of fast traders active in the market affects market liquidity.

INSERT TABLE 5 HERE

Having established that competition among HFTs as a group does not change, but rather competition among DMMs increases because some fast traders become DMMs in a particular basket of stocks, we delve into whether the change in competition among DMMs is different for different baskets of stocks. Table 3 highlights that the largest changes in competition among DMMs are observed in baskets 1, 2 and 3, whereas, for basket 4, the change in competition among DMMs is comparable to the change in competition among fast traders in general. We, therefore, perform a regression that tests whether there is a significant difference in competition among fast traders and among DMMs across baskets.

Table 5 presents the results of the market share regression (see Eq. (6)). The table takes into account the potential heterogeneity across baskets of stocks as defined in the pre-SLP period (see the appendix for basket composition details). The by basket analysis confirms the conclusion from the previous analysis, in that we observe only a marginal increase in the activity of fast traders. We also note that changes in the share of trades and trading volume stemming from fast traders are uniform across baskets. At the same time, activity shifts from the HFT-MIX-OTHER group to DMMs in all baskets of stocks; however, these shifts are not uniformly distributed across baskets. Specifically, basket 4, which is the reference basket in the regression, exhibits the smallest change in the activity of DMMs, according to Table 3. The coefficient reported in Table 5 for the variable SLP_d, where the most economically significant one is for the share of trades and is equal to 2.9%, that is, one-fourth of the increase for basket 1, for which we observe an increase of 10.8% (i.e., the sum of 2.9% and 7.9%).

These results are consistent with information we received from the AMF that basket 4 was the only basket that had the largest number of DMMs active in the pre-SLP period (see Fig. 2). We also investigate whether the increase in competition is different not only for basket 4 but also between baskets 1, 2, and 3. We perform an F-test, and the result

is that, for most of the measures of competition that we consider, these coefficients (i.e., $SLP_d \times Basket_j$) are not statistically different from each other between baskets 1, 2, and 3. Therefore, we group the three baskets into a single basket for further analysis as they exhibit a similar increase in competition among DMMs. We capitalize on this heterogeneity across baskets (i.e., the difference in the changes in competition among DMMs between baskets 1, 2, and 3 vs. basket 4) to isolate the effect of competition between DMMs from changes due to any other incentives arising from the implementation of the new SLP rules on June 3, 2013. Therefore, we test Hypotheses 1 and 2 by looking at how market liquidity changes for baskets 1, 2, and 3 compared with basket 4 (i.e., the coefficient ϕ in Eq. (8)).

6.3 New SLP rules: Competition versus incentives

In this section, we first ask how the new SLP rules affected market liquidity, namely, the combined change in the rules enforced by the exchange (i.e., Rule A and Rule B jointly). We run the regression in Eq. (7). In particular, we regress the different liquidity measures on the dummy variable SLP_d, which is equal to one in the post-event period (from June 3, 2013, until July 31, 2013) and zero in the pre-event period (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to the CAC40 index and zero if stock j belongs to the DAX30 index, and the interaction term $SLP_d \times CAC40_j$. We refer readers to Section IA 5 in the Internet Appendix for the formal test of the parallel trends assumption for this comparison.

INSERT TABLE 6 HERE

Table 6 presents the results of the regression with the quoted spread (Panel A) and the effective spread (Panel B) as dependent variables. In each case, we estimate three specifications: without fixed effects, with stock fixed effects, and with stock and day fixed effects. In each of the regressions, we control for stock and market volatilities, trading

volume, market capitalization, and the inverse of the stock price and cluster standard errors by stock and by day.

We observe that the new SLP rules decrease the marketwide quoted and effective spreads for CAC40 index constituents, relative to those for DAX30 index constituents across all three specifications, as manifested by the negative and significant interaction coefficients associated with $SLP_d \times CAC40_j$. We anchor our discussion on the most conservative specification with stock and day fixed effects. The marketwide quoted (effective) spread following the implementation of the new SLP rules decreases for CAC40 index constituents by 0.186 (0.164) bps, which is a 9.2% (7.8%) decline relative to the pre-SLP level. For the specification with both stock and day fixed effects, we cannot reject the notion that the coefficient for $SLP_d \times CAC40_j$ is equal to the size of the rebate received by DMMs for passive execution. Put differently, the new SLP rules lead to a transfer of the full rebate amount from DMMs to liquidity consumers, which is possible only under a competitive market structure. These results indicate that the new SLP rules positively affect market liquidity.

In the previous section, we showed that competition among DMMs increased following the implementation of the new SLP rules. However, this effect was not uniform across all baskets, and competition among fast traders remained largely unchanged. To distinguish between the pure effects of increased competition among DMMs and the effects stemming from changes in any other incentives for DMMs, we use a triple difference-in-differences methodology to compare the effect of the new SLP rules on baskets of stocks for which competition increased the most (baskets 1, 2, and 3), relative to baskets of stocks for which competition among DMMs remained largely unchanged (basket 4), both before and after the new SLP rules were implemented. To do this, we assign DAX30 index constituents as the control group. In particular, we estimate the regression described in Eq. (8), with similar definitions of the dummy variables and the interactions to the previous analysis.

INSERT TABLE 7 HERE

Table 7 presents the results of the regression with the quoted spread (Panel A) and the effective spread (Panel B) as dependent variables and the same controls and standard error clustering as before. Our findings are consistent across all our specifications. In our discussion of the results below, we will focus on the most conservative specification that includes both stock and day fixed effects.

We find that the new SLP rules marginally decrease the marketwide quoted spread and do not decrease effective spreads for the baskets with a relatively small change in competition among DMMs (captured by $SLP_d \times CAC40_j$). However, we observe the negative and significant effect of the new SLP rules for the baskets that exhibit a substantial increase in competition among DMMs, as manifested by the negative and significant interaction coefficients for $SLP_d \times CAC40_j \times Basket123_j$ (i.e., the coefficient ϕ in Eq. (8)). In particular, we show that the quoted (effective) spread decreases by 0.136 (0.133) bps, or 6.7% (6.4%) of the pre-SLP level, due to the effect of increased competition among DMMs. One might argue that this decrease in spreads does not translate into a decrease in overall transaction costs, and not simply for trades of small size. Rerunning the analysis for different transaction sizes (see Section 7.2), we show that our results are robust, and our conclusion does not change.

We conclude that the effect of the new SLP rules on market liquidity is largely driven by increased competition among DMMs (i.e., we cannot reject Hypothesis 1 and instead reject its antithesis, Hypothesis 2) and that DMMs could easily adjust their algorithms to formally comply with the change in other incentives, such as stricter requirements, without any *de facto* statistical and economic improvements in their liquidity provision. Our results elucidate that small static changes in the requirements for DMMs do not improve market liquidity provisions. Thus, our findings complement those of Bessembinder, Hao, and Zheng (2019), who report that the tightened requirements of DMMs, together with increased rebates for liquidity provision, improve market liquidity. Several potential explanations clarify this divergence in the two sets of results. First, the empirical setup of Bessembinder, Hao, and Zheng (2019) does not include the *simultaneous* increase in competition among DMMs

that appears in our analysis. Second, Bessembinder, Hao, and Zheng (2019) looks at the dynamic contract of DMMs, when requirements would be loosened again if the trading volume increases above a specified threshold; therefore, in their context, DMMs had a *direct* incentive to fulfill such requirements not only *de jure* but also *de facto*, given the exchange response. Third, the ultimate effect of the change in the requirements depends on the original level and tightness of the requirements already in place and the magnitude of the imposed changes.

Moreover, we perform an F-test to ascertain whether the improvement in liquidity due to the pure effect of competition among DMMs is comparable to the size of the rebate DMMs receive for passive execution (see Table 7). For the most conservative specification including stock and day fixed effects, we conclude that the liquidity improvement for baskets 1, 2, and 3 (baskets that experienced the largest increase in competition among DMMs) is indistinguishable at the 1% and 5% significance levels from the rebate that DMMs receive for passive execution (0.22 bps in the post-SLP period). This suggests that when faced with a low degree of competition, DMMs capitalize on the rebate and quote the same spread that any voluntary liquidity provider would quote. However, in the presence of competition from others, DMMs are willing to undercut another's quote, up to the size of the rebate received.

Having established that competition is the main driver of the quoted and effective spread reductions in the post-SLP period, we investigate whether the spread reduction has been equally distributed among trader categories. We, therefore, perform the previous analysis for each of the four trader categories.

INSERT TABLE 8 HERE

Table 8 shows the overall effect of the new SLP rules (see Eq. (8)) on spreads observed for different trader categories. For brevity, we report only the estimation results of the most conservative specification with stock and day fixed effects. We document that all four trader categories experienced a decrease in both quoted and effective spreads, after the

implementation of the new SLP rules, only in baskets of stocks with a large increase in competition among DMMs. This is documented by a negative and significant coefficient for $SLP_d \times CAC40_j \times Basket123_j$, and negative, but insignificant, coefficient for $SLP_d \times CAC40_j$ (the only exception is the quoted spread for NONHFT traders, but the effect is significant only at the 10% level). Thus, our analysis by trader type confirms the results of the analysis performed at the marketwide level.

In particular, competition between DMMs improves the effective spread observed for HFT-MM traders by 0.111 bps (6.1% of the pre-SLP level). The respective improvement for MIX-MM is 0.151 bps (6.4% of the pre-SLP level); for HFT-MIX-OTHER is 0.118 bps (5.7% of the pre-SLP level); and for NONHFT is 0.211 bps (5.1% of the pre-SLP level). Table 8 also reports the results of the test of whether the spread improvement is statistically similar to the rebates received by DMMs. The test shows that this improvement is statistically indistinguishable from that of the rebate received by DMMs for passive execution for NONHFT traders at the 10%, 5%, and 1% significance levels, for HFT-MM and HFT-MIX-OTHER at the 1% level, and for MIX-MM at the 5% and 1% levels, respectively.

On average, the trading volume per day for all CAC40 stocks is EUR 1,384 million; hence, in economic terms, the decrease in the effective spread of 0.133 bps due to the pure effect of competition among DMMs corresponds to a decrease in transaction costs of EUR 4.64 million per year. For HFT-MM traders who are active in all CAC40 stocks, the respective number is equal to EUR 1.23 million, while for NONHFT traders the respective number is equal to EUR 0.58 million. These findings highlight the key result that the increase in competition among DMMs significantly improves the trading conditions, both in statistical and in economic terms, not only for DMMs themselves but also for "slow" traders, that is, NONHFT traders; whereas, small changes in the requirements that DMMs have to fulfill do not translate into meaningful changes in market liquidity. The robustness of this last result will be tested in more detail in Section 7.4, where we show that none of the new requirements was binding for DMMs.

7 Robustness analysis

In this section, we perform several additional robustness tests. First, we show the effect of the new SLP rules on individual components of the effective spread: the realized spread and the price impact (see Section 7.1). Second, we repeat the analysis of the new SLP rules for the different transaction sizes (see Section 7.2). Third, we analyze whether the implementation of the new SLP rules exerts a spillover effect onto alternative trading venues, that is, Chi-X (see Section 7.3). Fourth, we show that the requirements enforced by the new SLP rules were not binding for DMMs as a group (see Section 7.4). Fifth, we show that our results hold when instead assigning non-SLP stocks as the control group (see Section 7.5). Sixth and finally, we demonstrate that small changes in rebates for DMMs indeed do not affect market liquidity (see Section 7.6).

7.1 New SLP rules: Spread decomposition

In this section, we analyze the effect of the new SLP rules on the decomposition of the effective spread. In particular, we address the question of whether the increase in competition among DMMs affected the revenues of liquidity providers, as measured by realized spreads (see Eq. (3)), and adverse selection costs, as measured by the price impact (see Eq. (4)).

INSERT TABLE 9 HERE

Table 9 provides the summary statistics for the effective spread, which is decomposed into the realized spread and price impact, based on a 10-second horizon for the pre-SLP (from April 1, 2013, until June 3, 2013) and post-SLP (from June 3, 2013, until July 31, 2013) periods.[17] During the pre-SLP period (see Panel A of Table 9), the marketwide realized spread for CAC40 index constituents is negative at -0.31 bps. The realized spread for DAX30 index constituents is also negative at -0.10 bps. The negative realized spreads signal that

[17] Section IA 6 in the Internet Appendix analyzes the other decomposition horizons.

a severe adverse selection problem exists and that, on average, the revenue of liquidity providers, net of adverse selection costs, is negative. This finding suggests that the market-making business in highly liquid stocks, such as the CAC40 index, requires a non-trivial set of skills and that the average liquidity provided does not earn profits on a risk-adjusted basis. We note that Colliard and Hoffmann (2017) also document negative realized spreads for SLP stocks, whereas non-SLP stocks are characterized by positive realized spreads. During the pre-SLP period, marketwide adverse selection costs, as captured by the price impact of the trade, are equal to 2.43 bps and 2.65 bps for CAC40 and DAX30, respectively.

We can further split the CAC40 index constituent sample by the type of trader initiating the transaction. We document that liquidity providers lose when they trade with HFT-MM, MIX-MM, and HFT-MIX-OTHER, whereas they profit on NONHFT trades. For a 10-second decomposition horizon, liquidity providers lose 0.91 bps if HFT-MM traders initiate a transaction, and the price impact of such a transaction is 2.76 bps. At the same time, liquidity providers profit 0.84 bps if NONHFTs initiate a transaction, and the price impact of such a transaction is 1.97 bps. We observe similar patterns for the post-SLP period (see Panel B of Table 9). This finding is in line with classical adverse selection models (such as Kyle (1985) and Glosten and Milgrom (1985)), in which liquidity providers lose to informed agents (HFT-MM) and profit from uninformed agents (NONHFT). This finding also highlights the fact that DMMs in modern markets can be viewed as the most informed agents from an intraday perspective, given their superior knowledge of order flow.

Panel C of Table 9 shows the differences in realized spreads and the price impact between the pre- and post-SLP periods. Based on univariate tests, we observe that the marketwide realized spread remains unchanged for CAC40 index constituents, but increases for DAX30 index constituents, whereas the price impact decreases for CAC40 index constituents, but remains unchanged for DAX30 index constituents. This finding seems to contradict the notion of increased competition among DMMs as one would expect that the increase in competition should decrease the revenue of the liquidity providers as captured by the realized

spread, and not vice versa. Next, we will examine this more closely in granular tests.

We formally test the effect of the new SLP rules on the decomposed effective spread and estimate Eq. (8) with the realized spread and price impact (i.e., the decomposed elements of the effective spread) as dependent variables. Table 10 presents the results of the estimation. For brevity, we report only the coefficients for $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$ for the specification that includes both stock and day fixed effects.

INSERT TABLE 10 HERE

The pure effect of competition among DMMs manifests itself in the coefficient for $SLP_d \times CAC40_j \times Basket123_j$. Table 10 shows that competition among DMMs significantly decreases the realized spread for the 10-second decomposition horizon by 0.173 bps for transactions initiated by NONHFT traders. The decrease in the realized spread, which is frequently interpreted as the revenue of the liquidity provider (net of adverse selection costs), is in line with what one might expect following an increase in competition among DMMs. Table 10 also reveals that the price impact component of the effective spread decreases significantly due to the pure effect of competition among DMMs for the 10-second decomposition horizon for the transaction initiated by HFT-MIX-OTHER.

Overall, the new SLP rules (as measured by the coefficient for $SLP_d \times CAC40_j$ plus $SLP_d \times CAC40_j \times Basket123_j$), at the marketwide level, decrease the realized spread for the 10-second decomposition horizon, whereas the marketwide effect on the price impact is not statistically significant.[18] In sum, at the marketwide level, the decrease in the realized spread component of the effective spread drives the decrease in the effective spread after the implementation of the new SLP rules. This finding is consistent with the decreased revenue from liquidity provision being due to increased competition among DMMs.

[18] In unreported results, we show that at the marketwide level, the overall effect of new SLP rules (as measured by the coefficient for $SLP_d \times CAC40_j$ plus $SLP_d \times CAC40_j \times Basket123_j$) on the realized spread (the price impact) is negative and statistically significant (insignificant) at the 5% level for the 10-second decomposition horizon.

7.2 New SLP rules: Different transaction sizes

In this section, we examine whether the improvement in market liquidity after the implementation of the new SLP rules is present across different transaction sizes or is concentrated on the smallest transactions. To do so, we split all the aggressive transactions for the sample stocks into quintiles, based on the number of shares traded using the data for the whole of the year 2013, with quintile 1 (quintile 5) including the smallest (largest) transactions.

INSERT TABLE 11

Table 11 shows the results of the regression (see Eq. (8)) of different transaction size quintiles. For brevity, we report only the coefficients for $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$, for the specification that includes both stock and day fixed effects.

We draw several conclusions from this analysis. First, we note that, in line with the main analysis, the main effect can be observed in those baskets that underwent a large increase in competition among DMMs, which can be seen from the negative and statistically significant coefficients for $SLP_d \times CAC40_j \times Basket123_j$ for all transaction sizes and trader categories, except the largest transactions (quintile 5) initiated by HFT-MM. The effect is decreasing while moving from small transactions to large transactions. In particular, the marketwide effective spread decreases by 0.159 bps for the smallest transactions, and by 0.110 bps for the largest transactions, due to the pure effect of increased competition among DMMs. Other changes enforced by the new SLP rules play a role only for the smallest transactions (quintiles 1 and 2), which can be seen from the negative and statistically significant coefficients for $SLP_d \times CAC40_j$. Overall, we observe the largest effect of competition among DMMs on the smallest transactions; nevertheless, increased competition among DMMs still significantly diminishes transaction costs for larger transactions, as well.

7.3 New SLP rules: Euronext versus Chi-X

In this section, we discuss whether the new SLP rules have any spillover effects into alternative trading venues. In particular, we examine whether the marketwide quoted and effective spreads observed in Chi-X, the other trading venue, reacted to the new SLP rules of NYSE Euronext Paris.[19] We note that the NYSE Euronext Paris accounts for approximately 72% of the total trading volume in CAC40, whereas Chi-X is the second-largest trading venue with approximately 14% of total trading volume in CAC40 in 2013.[20] We also note that all 36 stocks used in our analysis are also traded on Chi-X. The two markets substantially differ in their maker/taker fees: on Chi-X, a trader receives a rebate of 0.15 bps, when providing liquidity (limit order), and pays 0.30 bps when consuming liquidity (market order), and this maker/taker scheme is valid for all traders (not only for DMMs, as in the NYSE Euronext Paris).[21]

Table 12 presents the results of the regression (see Eq. (8)) using data for Chi-X, instead of that for the NYSE Euronext Paris and using the usual dummy variables, fixed effects, controls, and clustering of errors.

INSERT TABLE 12

We find that the new SLP rules significantly affected quoted and effective spreads on Chi-X. In particular, both the quoted and effective spreads on Chi-X decrease by 0.119 bps and 0.123 bps, respectively (focusing on the most conservative specification with both stock and day fixed effects), for the baskets of stocks that experienced a large increase in DMMs competition ($SLP_d \times CAC40_j \times Basket123_j$). We also note that, in line with the main

[19] We note that the new SLP rules do not affect the market share of the NYSE Euronext Paris (see Internet Appendix IA 7 for details).

[20] Data on market shares (based on the number of shares traded) come from Bloomberg. Data on the transactions and best bid-offer quotes for Chi-X come from the Thomson Reuters Tick History (TRTH) database.

[21] The Chi-X fee structure for the 2013 is available at http://cdn.batstrading.com/resources/press_releases/BATS_Chi-X_2013_Pricing_FINAL.pdf.

analysis, the effect of other changes introduced by the new SLP rules is not significant. In other words, the decreases in spreads on Chi-X, as well as on the NYSE Euronext Paris, are driven by increased competition among DMMs. Bessembinder, Hao, and Zheng (2019) report a similar improvement in liquidity on other trading venues arising from the changes in contract requirements of DMMs on NYSE. They argue that this result stems from strategic complementarities between the NYSE and other trading venues. Indeed, liquidity providers on other trading venues are likely to also quote lower spreads because they always have an outside option to unload any excess inventory they are left with to DMMs on the main trading venue.

7.4 New SLP rules: DMMs behavior

In this section, we show that the new requirements introduced by the new SLP rules were not binding for DMMs as a group in the pre-SLP period. To do so, we compute several variables that reflect the requirements that DMMs have to fulfill and then check whether the new requirements introduced by the new SLP rules were binding. As described in Section 3, these requirements involve restrictions on the minimum presence at the best bid-offer level (10% of the continuous session for each stock and 25% of the continuous session on average for CAC40 stocks), the minimum presence on both sides of the market (95% of the continuous session on average for stocks included in the basket), the minimum value displayed at the best bid-offer level (at least EUR 5,000 on average for stocks included in the basket), and the liquidity provision ratio (the share of passive execution of 0.10% for each stock relative to the total trading volume).

INSERT TABLE 13 HERE

Table 13 shows the average of these measures for all stocks in the CAC40 index, and for each of the baskets of stocks that DMMs could choose from prior to June 3, 2013, for the

pre-SLP (Panel A) and post-SLP (Panel B) periods, separately for HFT-MM and MIX-MM (we refer readers to the appendix for details of the basket composition before and after that date). Unfortunately, we cannot track the behavior of individual DMMs and, thus, can only confirm whether or not they fulfill the requirements as a group. Table 13 shows that the new requirements were already satisfied in the pre-SLP period and thus, are unlikely to result in any changes in market liquidity after the new SLP rules were implemented. We now move on to discussing each of the requirements in more detail.

The liquidity provision ratio was well above 0.10%, the minimum required by the new SLP rules. Moreover, the liquidity provision ratio improves in the post-SLP period, for both HFT-MM and MIX-MM groups, for CAC40 stocks as a whole, and for each of the four baskets of stocks. In particular, at the market level, we observe an increase in liquidity provision by HFT-MM from 24.2% to 35.5%, and by MIX-MM from 7.2% to 8.1%. This suggests that the new SLP rules shifted the liquidity provision activity from voluntary liquidity providers to DMMs, given that a larger share of the gross liquidity provision is provided now by DMMs.

The time presence at the first-five best prices of the limit order book levels slightly increases for both HFT-MM and MIX-MM, and is above 99% in the pre-SLP period for the CAC40 index and for each basket of stocks. The time presence at the best bid offer level slightly increases for MIX-MM (from 27.2% to 27.9% for CAC40) and decreases for HFT-MM (from 69.3% to 56.7% for CAC40), with a similar pattern present for the displayed quantity at the best bid-offer level. The displayed order value at the best bid-offer level increases for MIX-MM (from EUR 14.36 to 16.02 thousand) and decreases for HFT-MM (from EUR 34.82 to 23.27 thousand).

We note that, in the pre-SLP and post-SLP periods, HFT-MM and MIX-MM, as a group, comply with the new SLP rules (including those that remained unchanged). In particular, the time presence at the first-five best prices is above 95%; the displayed order value at the best price is far above 5,000 EUR; and the liquidity provision is above 0.1% of the total passive execution volume. DMMs also satisfy the requirement to be present at least 10% of

the continuous session at the best bid-offer level for each stock. The newly introduced Rule B3.2 requires that DMMs are, on average, across all CAC40 stocks, present at least 25% of the time at the best level of the limit order book. Both HFT-MM and MIX-MM traders comply with this requirement, as well.

Therefore, we conclude that none of the aforementioned requirements was binding for DMMs as a group.[22] The observed difference in the DMMs' behavior in the pre- and post-SLP periods is unlikely to be caused by these small changes in the requirements, but rather is a result of increased competition among DMMs.

7.5 New SLP rules: Non-SLP stocks as a control group

In this section, we repeat the analysis from the main section with the 36 largest non-SLP stocks as the control group. We note that the parallel trends assumption for CAC40 and the non-SLP groups' quoted and effective spreads is satisfied.[23]

INSERT TABLE 14 HERE

Table 14 presents the results of the regression with non-SLP stocks assigned as the control group with quoted, the effective spread as the dependent variable, and the usual dummy variables, fixed effects, controls, and clustering of errors. We show that the results are consistent with those from the main analysis. In particular, the pure effect of competition among DMMs decreases the quoted (effective) spread by 0.112 bps (0.103 bps), as opposed to 0.136 bps (0.133 bps) when using DAX30 as the control group ($SLP_d \times CAC40_j \times Basket123_j$). Contrary to the specification that assigns DAX30 as the control group, we also observe that changes in other incentives introduced by the new SLP rules also have a negative and signif-

[22] We note that this conclusion is valid, on average, across stock-days for HFT-MM and MIX-MM as a group. We implicitly assume that each individual DMM complies with the requirements, as well.

[23] We refer readers to Section IA 5 in the Internet Appendix for a formal test of the parallel trends assumption between CAC40 and non-SLP quoted and effective spreads around the new SLP rules.

icant effect on market liquidity ($SLP_d \times CAC40_j$).[24] Nevertheless, our conclusion about the importance of competition among DMMs (the main variable of interest) remains unchanged independent of the choice of the control group.

7.6 Rebate reversal: Market liquidity

The NYSE Euronext Paris increased the rebate for DMMs' passive execution from 0.20 bps to 0.22 bps when implementing new SLP rules on June 3, 2013; however, on November 1, 2013, the exchange reverted the rebate to the pre-June level. *Ex ante*, we would expect that such small changes (approximately 1% of the quoted spread in the pre-SLP period) in rebate should have, at best, a marginal effect on market liquidity, especially given that the reversal took place several months after the rebate was initially increased. We focus our attention on the time window two months before and after the implementation date of the rebate reversal on November 1, 2013.

We start by examining whether non-SLP stocks or DAX30 stocks are the more appropriate control group. We note that the parallel trends assumption for the CAC40 and DAX30 quoted and effective spreads is not satisfied around the rebate reversal event, while it is satisfied for the CAC40 and non-SLP quoted and effective spreads.[25] Therefore, we perform the analysis of the rebate reversal using non-SLP stocks as a control group.

INSERT TABLE 15 HERE

[24] We emphasize that the effect of other incentives on market liquidity depends on the choice of the control group (non-SLP stocks instead of DAX30 index constituents) and has to be interpreted with caution for the following reasons. First, non-SLP stocks are different from SLP stocks in size and in their liquidity levels. Second, the trader composition of non-SLP stocks differs from that of SLP stocks too. Third, there is a non-negligible chance of within-market spillover effects on non-SLP stocks due to the implementation of the new SLP rules. We note that none of these concerns is valid for DAX30 index constituents assigned to the control group. Therefore, we base our conclusion about no tangible effect of the small changes in DMMs' incentives on market liquidity on our main analysis only.

[25] We refer readers to Section IA 5 in the Internet Appendix for a formal test of the parallel trends assumption between CAC40, DAX30, and non-SLP quoted and effective spreads around the rebate reversal event.

Table 15 provides the regression results (see Eq. (9)) for the changes in market liquidity that occur around the rebate reversal to the pre-SLP level from -0.22 bps to -0.20 bps, which occurred on November 1, 2013, with the usual dummy variables, fixed effects, controls, and clustering of errors. We observe that the coefficients for the interaction term, $CAC40_j \times Rebate_d$, are statistically insignificant for the quoted and effective spreads across all specifications.

To conclude, our findings confirm our *ex ante* expectation that small changes in the DMMs' rebate (0.02 bps, which is approximately 1% of the quoted spreads in the pre-SLP period) do not materially affect market liquidity. Given that the change in the rebate that occurred on November 1, 2013, exactly offsets the change in rebate that occurred on June 3, 2013 (at the same time as the change in SLP rules), we argue that any effect observed around the change in SLP rules is attributable to sources other than the change in the maker/taker fee structure. We emphasize that our analysis does not offer any conclusion about large changes in the rebate, which may well materially affect market liquidity.

8 Conclusion

The evolving trading environment has reshaped the market-making business in global equity markets. Traditional market makers were crowded out by algorithmic liquidity providers, often operating voluntarily, without any obligations for maintaining stable markets. The "Flash Crash" in the U.S. market on May 6, 2010, exemplifies one such episode that has raised serious doubts among academics and regulators about the efficacy of voluntary liquidity provision by algorithmic traders (and especially its subset of HFTs) in modern financial markets, particularly in terms of market stress. Thus, it is not surprising that high-frequency market making has drawn the close scrutiny of regulators who must ensure continuous participation of traders in market making. For example, the recently implemented MiFID II regulation explicitly focuses on requirements for such market makers and has made

written contracts between high-frequency market makers and stock exchanges mandatory. In this paper, we empirically address the issue of such an optimal contract design between DMMs and stock exchanges to facilitate better liquidity provision.

Our findings allow us to conclude that specifying the requirements that DMMs have to fulfill and providing them with an attractive fee structure might improve liquidity provision in equity markets but will not necessarily lead to the best possible outcome unless exchanges explicitly introduce competition among DMMs for providing liquidity for the same stock. This broad conclusion is robust to controlling for several other effects, including the composition of the baskets, the fee rebates offered, and the size of the transaction. These conclusions are likely to be of interest to security market regulators and exchanges who seek to improve liquidity provision in the face of rapid changes in trading technology and execution speed.

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Table 1 Data description.

This table reports the number of stocks and the average market capitalization in EUR bln, the trading volume in EUR mln, and the inverse of the stock price in February 2013 for CAC40 index constituents (36 stocks that have NYSE Euronext Paris as their main trading venue), DAX30 index constituents, and the 36 largest non-SLP stocks. We also report the difference-in-means test between CAC40 and DAX30 index constituents, and between CAC40 index constituents and 36 largest non-SLP stocks. Data on stock market capitalization and price come from Datastream. The data on trading volume come from the BEDOFIH and TRTH databases for French and German stocks, respectively.

	# of stocks	MCAP, EUR bln	Inverse of price	Trading volume, EUR mln
Panel A: CAC40 versus DAX30				
CAC40	36	26.058	0.041	2.771
DAX30	30	26.447	0.035	4.679
Difference		-0.389	0.006	-1.909
		(-0.07)	(0.70)	(-1.01)
Panel B: CAC40 versus non-SLP				
CAC40	36	26.058	0.041	2.771
non-SLP	36	9.742	0.049	0.194
Difference		16.316***	-0.008	2.577***
		(2.99)	(-0.62)	(4.99)

Table 2 Summary statistics: Spreads around new SLP rules.

This table records the average across stock-days of quoted (see Eq. (1)) and effective (see Eq. (2)) spreads in basis points for the whole market as well as for those spreads observed for each trader account type (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT) while initiating the transaction. Panel A reports summary statistics for the two months before the implementation of the new SLP rules (from April 1, 2013, until June 3, 2013). Panel B reports summary statistics for the two months after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013). Panel C provides a univariate t-test with standard errors clustered by stock and by day for the mean difference between pre-SLP and post-SLP periods. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database. $^{*}p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

	French stocks					German stocks
	CAC40	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT	DAX30
	Panel A: Pre-SLP period					
Quoted spread	2.02	1.82	1.90	2.01	2.51	2.07
Effective spread	2.09	1.83	1.94	2.07	2.72	2.51
	Panel B: Post-SLP period					
Quoted spread	1.92	1.75	1.86	1.95	2.36	2.15
Effective spread	1.99	1.76	1.90	2.02	2.62	2.59
	Panel C: Difference					
Quoted spread	-0.107***	-0.074*	-0.043	-0.066*	-0.149***	0.086**
Effective spread	-0.103***	-0.069*	-0.045	-0.048	-0.097**	0.079**

Table 3 New SLP rules: Market share of fast traders and DMMs.

This table shows the average across stock-days of the market share of fast traders ($\frac{HFT+MIX}{All\ traders}$) and the market share of DMMs ($\frac{DMM}{HFT+MIX}$) around the new SLP rules. In particular, we show the proportion of the total number of messages, the proportion of the total number of traders, and the proportion of the total trading volume attributable to fast traders. In addition, we report the proportion of the number of messages from fast traders, the proportion of the total number of traders from fast traders, and the proportion of the total trading volume from fast traders attributable to DMMs (HFT-MM and MIX-MM). We report the results for all stocks in the CAC40 and also separately for each basket of stocks as defined in the pre-SLP period (we refer readers to the appendix for basket composition details). The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index. The period under consideration ranges from April 1, 2013, until June 3, 2013 (Panel A: pre-SLP period) and from June 3, 2013, until July 31, 2013 (Panel B: post-SLP period). Order flow data with trader and account flags come from BEDOFIH.

	$\frac{HFT+MIX}{All\ traders}$					$\frac{DMM}{HFT+MIX}$				
	CAC40	Basket 1	Basket 2	Basket 3	Basket 4	CAC40	Basket 1	Basket 2	Basket 3	Basket 4
Panel A: Pre-SLP period										
% of Messages	97.1%	97.4%	97.4%	96.5%	97.1%	72.7%	67.8%	77.3%	64.6%	80.6%
% of Trades	82.4%	83.2%	82.4%	81.8%	82.1%	43.5%	43.5%	42.6%	41.6%	46.8%
% of Trading volume	81.6%	82.0%	81.9%	81.2%	81.2%	31.9%	31.2%	32.4%	30.2%	33.7%
Panel B: Post-SLP period										
% of messages	97.4%	97.7%	97.7%	97.1%	96.8%	82.9%	84.7%	84.7%	81.4%	80.3%
% of trades	84.4%	85.4%	84.5%	83.9%	83.7%	50.9%	53.6%	50.3%	50.7%	49.3%
% of trading volume	83.3%	84.1%	83.1%	83.0%	83.0%	38.3%	39.8%	38.9%	38.0%	36.3%
Panel C: Difference										
% of messages	0.242**	0.336**	0.286	0.574***	-0.287***	10.153***	16.855***	7.454***	16.837***	-0.357
% of trades	2.035***	2.190***	2.113***	2.149***	1.642**	7.439***	10.126***	7.731***	9.052***	2.534***
% of trading volume	1.652***	2.059***	1.148	1.803***	1.770**	6.388***	8.539***	6.489***	7.724***	2.594***

Table 4 New SLP rules: Competition among fast traders versus competition among DMMs.

This table shows the results of the activity regression (see Eq. (5)). We regress the activity (share of messages, trades, and trading volume) of fast traders ($\frac{HFT+MIX}{All\ traders}$) and DMMs ($\frac{DMM}{HFT+MIX}$) for stock j, on day d, on the dummy variable, SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013), and zero otherwise (from April 1, 2013, until June 3, 2013). In all regressions, we control for stock and market volatilities, the inverse of the stock price, and market capitalization. All our regressions are estimated with stock fixed effects. Standard errors are clustered by stock and by day. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index. Data for French stocks come from BEDOFIH database. $^*p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

	$\frac{HFT+MIX}{All\ traders}$			$\frac{DMM}{HFT+MIX}$		
	% of messages	% of trades	% of trading volume	% of messages	% of trades	% of trading volume
SLP_d	0.002**	0.021***	0.016***	0.103***	0.079***	0.066***
	(2.20)	(5.44)	(3.96)	(7.50)	(9.09)	(8.39)
$Realized\ volatility_{j,d}$	-0.000	0.003**	0.001	0.000	0.007**	0.004
	(-0.78)	(1.98)	(0.37)	(0.07)	(2.54)	(1.56)
$Market\ capitalization_{j,d}$	0.000	-0.002	-0.000	0.007*	-0.002	-0.000
	(1.02)	(-1.15)	(-0.26)	(1.94)	(-0.59)	(-0.00)
$Inverse\ of\ price_{j,d}$	0.312	0.287	0.451	1.139	-0.726	-0.085
	(1.00)	(0.48)	(0.54)	(0.47)	(-0.47)	(-0.07)
$Market\ volatility_d$	-0.000	0.001	0.001	-0.005***	-0.003*	-0.002
	(-0.78)	(0.68)	(1.10)	(-3.43)	(-1.76)	(-1.34)
$Constant$	0.928***	0.744***	0.707***	0.591*	0.661***	0.420**
	(20.18)	(8.22)	(5.93)	(1.81)	(2.81)	(2.24)
Observations	3,060	3,060	3,060	3,060	3,060	3,060
Adjusted R^2	0.477	0.219	0.123	0.658	0.520	0.442
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	No	No	No	No	No	No
Clustered SE	By stock and day			By stock and day		

Table 5 New SLP rules: Competition among fast traders versus competition among DMMs by baskets of stocks.

This table shows the results of the activity regression (see Eq. (6)) for each baskets of stocks as defined in the pre-SLP period (we refer readers to the appendix for basket composition details). We regress the activity (share of messages, trades, and trading volume) of fast traders ($\frac{HFT+MIX}{All\ traders}$) and DMMs ($\frac{DMM}{HFT+MIX}$) for stock j, on day d, on the dummy variable, SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013), and zero otherwise (from April 1, 2013, until June 3, 2013). In all regressions, we control for stock and market volatilities, the inverse of the stock price, and market capitalization. All our regressions are estimated with stock fixed effects. Standard errors are clustered by stock and by day. t-statistics are reported in parentheses. We also report p-values for the F-tests of the equality of coefficients across baskets. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index. Data for French stocks come from BEDOFIH database. $^*p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

	$\frac{HFT+MIX}{All\ traders}$			$\frac{DMM}{HFT+MIX}$		
	% of Messages	% of Trades	% of Trading volume	% of Messages	% of Trades	% of Trading volume
SLP_d	-0.003**	0.016**	0.016*	-0.000	0.029***	0.028***
	(-2.09)	(2.23)	(1.87)	(-0.00)	(3.28)	(3.36)
$SLP_d \times Basket\ 1$	0.007***	0.008	0.004	0.171***	0.079***	0.061***
	(3.39)	(1.20)	(0.52)	(9.67)	(6.22)	(4.81)
$SLP_d \times Basket\ 2$	0.006***	0.006	-0.005	0.077***	0.055***	0.040***
	(3.01)	(1.01)	(-0.53)	(6.01)	(4.32)	(3.38)
$SLP_d \times Basket\ 3$	0.009***	0.006	0.001	0.171***	0.067***	0.052***
	(6.45)	(0.89)	(0.08)	(13.74)	(6.72)	(5.84)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	No	No	No	No	No	No
Clustered SE		By Stock and Day			By Stock and Day	
p-value $SLP_d \times Basket\ 1 = SLP_d \times Basket\ 2$	0.692	0.783	0.185	0.000***	0.0983	0.152
p-value $SLP_d \times Basket\ 1 = SLP_d \times Basket\ 3$	0.189	0.690	0.450	0.975	0.365	0.486
p-value $SLP_d \times Basket\ 2 = SLP_d \times Basket\ 3$	0.083	0.926	0.402	0.000***	0.344	0.309

Table 6 New SLP rules: Marketwide liquidity.

This table shows the results of the SLP regression (see Eq. (7)). We regress the quoted (Panel A) and effective (Panel B) spreads for stock j, on day d, on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to the CAC40 index and zero if stock j belongs to the DAX30 index and on the interaction term $SLP_d \times CAC40_j$. In all regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database. *p <0.1; **p <0.05; ***p <0.01.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.141***	-0.143***	-0.186***	-0.126**	-0.121**	-0.164***
	(-2.95)	(-2.99)	(-4.13)	(-2.57)	(-2.43)	(-3.49)
SLP_d	0.016	0.022		0.007	0.005	
	(0.39)	(0.56)		(0.16)	(0.12)	
$CAC40_j$	-0.506***			-0.884***		
	(-4.55)			(-7.87)		
Realized volatility$_{j,d}$	0.148***	0.093***	0.070***	0.149***	0.092***	0.063***
	(5.93)	(6.77)	(5.30)	(5.65)	(5.68)	(3.80)
Trading volume$_{j,d}$	-0.074***	-0.012*	-0.020***	-0.066***	0.001	-0.007
	(-3.51)	(-1.77)	(-2.76)	(-3.03)	(0.12)	(-0.89)
Market capitalization$_{j,d}$	-0.007**	-0.016**	-0.020**	-0.008***	-0.009	-0.013
	(-2.48)	(-1.97)	(-2.43)	(-2.77)	(-1.18)	(-1.62)
Inverse of price$_{j,d}$	4.702***	-8.237	-8.613	4.789***	-3.781	-4.457
	(3.84)	(-1.09)	(-1.12)	(3.80)	(-0.63)	(-0.70)
Market volatility$_d$	0.032***	0.037***		0.033***	0.036***	
	(4.99)	(5.99)		(4.57)	(5.89)	
Constant	1.798***	1.945***	2.694***	2.228***	2.094***	2.820***
	(12.91)	(4.42)	(5.53)	(14.64)	(5.44)	(6.88)
Observations	5,613	5,613	5,613	5,613	5,613	5,613
R^2	0.380	0.821	0.844	0.493	0.837	0.858
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By stock and day			By stock and day		
p-value $SLP_d \times CAC40_j = Rebate$	0.098*	0.106	0.457	0.055*	0.048**	0.232

Table 7 New SLP rules: Competition versus incentives.

This table shows the results of the SLP regression (see Eq. (8)). We regress quoted (Panel A) and effective (Panel B) spreads for stock j on day d on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one, if stock j belongs to Baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$, and $SLP_d \times CAC40_j \times Basket123_j$. In all the regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database. $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.046	-0.036	-0.081*	-0.035	-0.018	-0.061
	(-1.13)	(-0.70)	(-1.65)	(-0.89)	(-0.36)	(-1.32)
$SLP_d \times CAC40_j \times Basket123_j$	-0.123***	-0.137***	-0.136***	-0.118***	-0.133***	-0.133***
	(-4.31)	(-2.90)	(-2.85)	(-4.25)	(-2.82)	(-2.73)
SLP_d	0.017	0.021		0.008	0.004	
	(0.41)	(0.55)		(0.19)	(0.11)	
$CAC40_j$	-0.341**			-0.730***		
	(-2.43)			(-4.97)		
$Basket123_j$	-0.220*			-0.206		
	(-1.73)			(-1.52)		
$Realized\ volatility_{j,d}$	0.151***	0.093***	0.069***	0.153***	0.091***	0.062***
	(6.19)	(6.94)	(5.49)	(5.83)	(5.79)	(3.88)
$Trading\ volume_{j,d}$	-0.076***	-0.012*	-0.019***	-0.068***	0.001	-0.006
	(-3.93)	(-1.74)	(-2.73)	(-3.35)	(0.16)	(-0.85)
$Market\ capitalization_{j,d}$	-0.007***	-0.015*	-0.019**	-0.008***	-0.008	-0.011
	(-2.66)	(-1.78)	(-2.24)	(-2.96)	(-0.99)	(-1.44)
$Inverse\ of\ price_{j,d}$	0.032***	0.037***		0.033***	0.036***	
	(5.09)	(6.08)		(4.63)	(5.96)	
$Market\ volatility_d$	4.436***	-8.607	-8.971	4.538***	-4.140	-4.807
	(3.97)	(-1.17)	(-1.20)	(3.89)	(-0.71)	(-0.78)
$Constant$	1.810***	1.912***	2.661***	2.239***	2.063***	2.787***
	(13.21)	(4.39)	(5.56)	(14.89)	(5.44)	(6.94)
Observations	5,613	5,613	5,613	5,613	5,613	5,613
Adjusted R^2	0.410	0.823	0.846	0.513	0.838	0.859
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By stock and day			By stock and day		
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.312	0.353	0.948	0.202	0.196	0.607
p-value $SLP_d \times Basket123_j = Rebate$	0.001***	0.081*	0.077*	0.000***	0.067*	0.072*

Table 8 New SLP rules: Competition versus incentives by trader type.

This table shows the results of SLP regression (see Eq. (8)) for each trader account type (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT) that initiates a transaction. We regress quoted (Panel A) and effective (Panel B) spreads for stock j on day d on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one if stock j belongs to baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$. In all regressions, we control for stock volatility, trading volume, market capitalization, and the inverse of the stock price. For brevity, we report only specifications with both stock and day fixed effects. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database. *p <0.1; **p <0.05; ***p <0.01.

	Panel A: Quoted spread				**Panel B: Effective spread**			
	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT
$SLP_d \times CAC40_j$	-0.071	-0.038	-0.055	-0.114*	-0.052	-0.021	-0.024	-0.058
	(-1.21)	(-0.71)	(-0.94)	(-1.78)	(-0.92)	(-0.39)	(-0.43)	(-0.98)
$SLP_d \times CAC40_j \times Basket123_j$	-0.118**	-0.124***	-0.127***	-0.157***	-0.111**	-0.124**	-0.118***	-0.138**
	(-2.19)	(-2.62)	(-2.59)	(-2.59)	(-2.12)	(-2.51)	(-2.63)	(-2.44)
$Realized\ volatility_{j,d}$	0.052***	0.040***	0.062***	0.080***	0.038***	0.028*	0.047***	0.064***
	(4.23)	(2.99)	(5.30)	(5.49)	(2.80)	(1.80)	(3.56)	(4.12)
$Trading\ volume_{j,d}$	-0.015*	-0.016*	-0.015*	-0.031***	0.000	0.001	0.002	-0.012
	(-1.67)	(-1.68)	(-1.68)	(-2.80)	(0.01)	(0.07)	(0.21)	(-1.00)
$Market\ capitalization_{j,d}$	-0.019*	-0.019*	-0.023**	-0.023**	-0.011	-0.011	-0.015	-0.013
	(-1.67)	(-1.66)	(-2.00)	(-2.09)	(-1.09)	(-1.09)	(-1.52)	(-1.33)
$Inverse\ of\ price_{j,d}$	-13.039	-14.145	-12.337	-13.243	-8.001	-9.420	-7.152	-8.940
	(-1.20)	(-1.31)	(-1.13)	(-1.20)	(-1.05)	(-1.22)	(-0.96)	(-1.18)
$Constant$	2.758***	2.797***	2.860***	3.040***	2.832***	2.866***	2.925***	3.023***
	(4.00)	(4.04)	(4.08)	(4.35)	(5.42)	(5.36)	(5.52)	(5.80)
Observations	5,613	5,613	5,613	5,613	5,613	5,613	5,613	5,613
Adjusted R^2	0.850	0.801	0.830	0.829	0.884	0.838	0.854	0.816
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	By stock and day				By stock and day			
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.588	0.314	0.469	0.391	0.322	0.214	0.151	0.692
p-value $SLP_d \times Basket123_j = Rebate$	0.061*	0.045**	0.057*	0.301	0.038**	0.052*	0.024**	0.148

Table 9 Summary statistics: Spread decomposition.

This table shows the averages across stock-days of the realized spread (see Eq. (3)) and the price impact (see Eq. (4)) components of the effective spread in basis points for the whole market as well as the spreads observed for each trader account type (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT) while initiating the transaction for the 10-second decomposition horizon. Panel A reports the summary statistics for the two months before the announcement of the new SLP rules (from April 1, 2013, until June 3, 2013). Panel B reports the summary statistics for the two months after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013). The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

	French stocks					German stocks
	CAC40	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT	DAX30
Panel A: Pre-SLP period						
Realized spread	-0.31	-0.91	-0.67	-0.22	0.84	-0.10
Price impact	2.43	2.76	2.61	2.31	1.97	2.65
Panel B: Post-SLP period						
Realized spread	-0.30	-0.79	-0.61	-0.10	0.85	0.01
Price impact	2.31	2.57	2.52	2.14	1.84	2.63
Panel C: Difference						
Realized spread	0.011	0.117***	0.053	0.125***	0.012	0.106***
Price impact	-0.120**	-0.193***	-0.081	-0.178***	-0.123***	-0.019

Table 10 New SLP rules: Spread decomposition.

This table shows the results of the SLP regression for the realized spread (see Eq. (3)) and the price impact (see Eq. (4)) components of the effective spread (see Eq. (8)). We regress the realized spread and price impact components of the effective spread for stock j on day d on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one if stock j belongs to baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$. In all regressions, we control for stock volatility, trading volume, and market capitalization, and the inverse of the stock price. For brevity, we report only the coefficients in front of the interaction terms for the specifications with both stock and day fixed effects. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database. $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

	$SLP_d \times CAC40_j$					$SLP_d \times \times CAC40_j \times Basket123_j$				
	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT
Realized spread	-0.093**	-0.010	-0.090	-0.025	0.017	-0.038	-0.015	0.006	0.024	-0.173***
	(-2.28)	(-0.19)	(-1.23)	(-0.49)	(0.23)	(-1.06)	(-0.35)	(0.10)	(0.49)	(-2.67)
Price impact	0.017	-0.044	0.089	0.007	-0.048	-0.095	-0.094	-0.125	-0.148***	-0.009
	(0.26)	(-0.51)	(0.89)	(0.11)	(-0.66)	(-1.61)	(-1.15)	(-1.46)	(-2.76)	(-0.15)
Controls	Yes									
Stock FE	Yes									
Day FE	Yes									
Clustered SE	By stock and day									

Table 11 New SLP rules: Liquidity by transaction sizes.

This table shows the results of the SLP regression (see Eq. (8)) for transaction size quintiles (based on the transactions in 2013). We regress the effective spread for stock j on day d on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one if stock j belongs to baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$. In all regressions, we control for stock volatility, trading volume, and market capitalization, and the inverse of the stock price. For brevity, we report only the coefficients in front of the interaction terms for the specifications with both stock and day fixed effects. Standard errors are clustered by stock and by day. We analyze the whole market as well as those spreads observed for each trader account type (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT) while initiating the transaction. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database. $^*p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

	$SLP_d \times CAC40_j$					$SLP_d \times CAC40_j \times Basket123_j$				
	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT
Quintile 1 (small transactions)	-0.133**	-0.154***	-0.079	-0.088*	-0.165***	-0.159***	-0.153***	-0.172***	-0.141***	-0.130**
	(-2.52)	(-2.64)	(-1.42)	(-1.65)	(-2.62)	(-2.95)	(-2.94)	(-3.80)	(-3.21)	(-2.13)
Quintile 2	-0.101*	-0.126**	-0.010	-0.051	-0.094	-0.152***	-0.147***	-0.149**	-0.152***	-0.166**
	(-1.91)	(-2.09)	(-0.15)	(-0.90)	(-1.37)	(-2.78)	(-2.75)	(-2.47)	(-3.15)	(-2.55)
Quintile 3	-0.070	-0.075	-0.021	-0.045	-0.094	-0.149***	-0.145***	-0.098*	-0.136***	-0.152**
	(-1.48)	(-1.30)	(-0.35)	(-0.80)	(-1.42)	(-2.97)	(-2.72)	(-1.77)	(-2.86)	(-2.45)
Quintile 4	-0.028	-0.031	0.025	-0.013	-0.064	-0.160***	-0.147**	-0.135***	-0.137**	-0.165***
	(-0.55)	(-0.51)	(0.46)	(-0.20)	(-1.05)	(-3.03)	(-2.53)	(-2.73)	(-2.55)	(-2.76)
Quintile 5 (large transactions)	-0.058	-0.049	-0.040	-0.022	0.024	-0.110**	-0.067	-0.101**	-0.101**	-0.142***
	(-1.32)	(-0.95)	(-0.79)	(-0.43)	(0.43)	(-2.38)	(-1.30)	(-2.16)	(-2.34)	(-2.64)
Controls	Yes									
Stock FE	Yes									
Day FE	Yes									
Clustered SE	By stock and day									

Table 12 New SLP rules: Chi-X.

This table shows the results of the SLP regression (see Eq. (8)) for Chi-X. We regress quoted (Panel A) and effective (Panel B) spreads for stock j on day d on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013) and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one if stock j belongs to baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$. In all regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris and Chi-X that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data come from TRTH database. *p <0.1; **p <0.05; ***p <0.01.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	0.017	-0.005	-0.057	0.033	0.018	-0.033
	(0.29)	(-0.08)	(-1.04)	(0.61)	(0.31)	(-0.60)
$SLP_d \times CAC40_j \times Basket123_j$	-0.105**	-0.122**	-0.119**	-0.108**	-0.123**	-0.123**
	(-2.16)	(-2.42)	(-2.37)	(-2.22)	(-2.44)	(-2.36)
SLP_d	0.012	0.018		0.002	0.001	
	(0.26)	(0.41)		(0.05)	(0.01)	
$CAC40_j$	-0.583***			-1.018***		
	(-4.24)			(-6.91)		
$Basket123_j$	-0.217*			-0.191		
	(-1.78)			(-1.45)		
$Realized\ volatility_{j,d}$	0.174***	0.110***	0.086***	0.170***	0.105***	0.073***
	(6.62)	(7.52)	(5.54)	(5.86)	(6.21)	(3.99)
$Trading\ volume_{j,d}$	-0.061***	0.006	-0.002	-0.054***	0.018**	0.010
	(-3.30)	(0.80)	(-0.19)	(-2.67)	(2.37)	(1.22)
$Market\ capitalization_{j,d}$	-0.008***	-0.014	-0.018*	-0.009***	-0.007	-0.010
	(-3.17)	(-1.39)	(-1.86)	(-3.46)	(-0.80)	(-1.20)
$Inverse\ of\ price_{j,d}$	4.063***	-11.091	-11.331	4.197***	-6.151	-6.561
	(3.13)	(-1.19)	(-1.19)	(3.18)	(-0.89)	(-0.91)
$Market\ volatility_d$	0.036***	0.043***		0.038***	0.042***	
	(5.30)	(6.46)		(5.21)	(6.79)	
Constant	1.773***	1.748***	2.604***	2.197***	1.899***	2.708***
	(12.45)	(3.34)	(4.52)	(14.18)	(4.45)	(6.10)
Observations	5,548	5,548	5,548	5,548	5,548	5,548
Adjusetd R^2	0.433	0.820	0.838	0.558	0.852	0.868
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By stock and day			By stock and day		
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.045**	0.106	0.443	0.029**	0.061*	0.284
p-value $SLP_d \times Basket123_j = Rebate$	0.018**	0.050**	0.046**	0.022**	0.056*	0.062*

Table 13 New SLP rules: DMMs' behavior.

This table shows the average across stock-days for the requirements of DMMs. In particular, we show the average time presence at the best bid-offer level and at the first-five best-price levels (the amount of seconds present at the best bid-offer level or at the first-five best-price levels relative to the total amount of seconds during a continuous trading session), the order value in EUR displayed at the best bid-offer level, and liquidity provision (number of shares executed passively by the trader account type relative to the total trading volume per stock-day) separately for HFT-MM and MIX-MM. We report the results for all stocks in CAC40 and also separately for each basket of stocks as defined in the pre-SLP period (we refer readers to the appendix for basket composition details). The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index. The period under consideration is from April 1, 2013, until June 3, 2013 (Panel A: pre-SLP period), and from June 3, 2013, until July 31, 2013 (Panel B: post-SLP period). Data for the French stocks come from the BEDOFIH database.

	HFT-MM					MIX-MM				
	CAC40	Basket 1	Basket 2	Basket 3	Basket 4	CAC40	Basket 1	Basket 2	Basket 3	Basket 4
	Panel A: Pre-SLP period									
Gross liquidity provision (%)	24.2%	23.7%	22.7%	22.0%	29.1%	6.4%	7.2%	6.7%	6.2%	5.4%
Displayed order at value at BBO	34.82	35.88	33.87	37.94	31.55	14.36	12.13	14.31	13.96	17.10
Time presence 5-best prices	99.3%	99.4%	99.2%	99.3%	99.4%	99.7%	99.4%	99.8%	99.5%	99.8%
Time presence at BBO	59.3%	58.8%	56.1%	61.5%	61.5%	27.2%	19.8%	30.8%	23.9%	33.6%
	Panel B: Post-SLP period									
Gross liquidity provision (%)	35.5%	37.5%	35.3%	34.2%	35.1%	6.9%	8.1%	6.8%	6.5%	6.5%
Displayed order at value at BBO	23.27	24.52	19.43	28.77	21.10	16.02	14.56	13.25	18.78	18.20
Time presence 5-best prices	99.6%	99.7%	99.4%	99.7%	99.6%	99.8%	99.7%	99.8%	99.8%	99.8%
Time presence at BBO	56.7%	55.5%	50.7%	62.8%	59.1%	27.9%	27.0%	25.4%	29.6%	30.5%

Table 14 New SLP rules: Competition versus incentives (non-SLP stocks as a control group).

This table shows the results of SLP regression (see Eq. (8)). We regress quoted (Panel A) and effective (Panel B) spreads for stock j, on day d, on the dummy variable SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013, until July 31, 2013), and zero otherwise (from April 1, 2013, until June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to CAC40 index and zero if stock j is a non-SLP stock, on the dummy variable $Basket123_j$, which is equal to one if stock j belongs to Baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity increases) in the pre-SLP period and zero otherwise (see the appendix for basket composition details), and on the interaction terms $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$. In all regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 36 largest non-SLP stocks. Data for French stocks come from BEDOFIH database. *p <0.1; **p <0.05; ***p <0.01.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.131*	-0.172**	-0.172**	-0.110	-0.149**	-0.149**
	(-1.78)	(-2.38)	(-2.35)	(-1.51)	(-2.03)	(-2.00)
$SLP_d \times CAC40_j \times Basket123_j$	-0.118*	-0.115**	-0.112**	-0.107*	-0.108**	-0.103**
	(-1.95)	(-2.41)	(-2.41)	(-1.68)	(-2.30)	(-2.28)
SLP_d	0.137***	0.145**		0.125***	0.129*	
	(3.00)	(1.98)		(3.30)	(1.74)	
$CAC40_j$	-2.100***			-2.337***		
	(-6.67)			(-6.26)		
$Basket123_j$	-0.428**			-0.466*		
	(-2.12)			(-1.90)		
Realized volatility$_{j,d}$	0.484***	0.177***	0.155***	0.548***	0.192***	0.174***
	(5.48)	(9.79)	(8.58)	(4.95)	(10.31)	(9.08)
Trading volume$_{j,d}$	-0.302***	-0.107***	-0.107***	-0.344***	-0.106***	-0.106***
	(-4.59)	(-6.02)	(-6.05)	(-4.24)	(-5.90)	(-5.85)
Market capitalization$_{j,d}$	0.019**	-0.010	-0.026**	0.024**	-0.009	-0.027**
	(2.09)	(-1.06)	(-2.33)	(2.15)	(-0.92)	(-2.30)
Inverse of price$_{j,d}$	-0.013	0.022**		-0.024	0.017	
	(-0.90)	(2.00)		(-1.38)	(1.53)	
Market volatility$_d$	10.135**	12.796*	9.297	11.690**	12.144*	8.810
	(2.43)	(1.89)	(1.33)	(2.34)	(1.83)	(1.29)
Constant	3.402***	6.861***	7.326***	3.693***	7.806***	8.163***
	(8.89)	(44.15)	(45.80)	(8.34)	(50.96)	(49.42)
Observations	6,109	6,109	6,109	6,109	6,109	6,109
Adjusted R^2	0.615	0.919	0.922	0.592	0.923	0.926
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By stock and day			By stock and day		
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.621	0.382	0.419	0.951	0.632	0.691
p-value $SLP_d \times Basket123_j = Rebate$	0.094*	0.029**	0.019**	0.075*	0.017**	0.009***

Table 15 Rebate reversal: Marketwide liquidity.

This table shows the results of the rebate reversal estimation (see Eq. (9)). We regress the quoted (Panel A) and the effective (Panel B) spreads for stock j on day d on the dummy variable $Rebate_d$, which is equal to one in the period after the implementation of the rebate reversal rules (from November 1, 2013, until December 31, 2013) and zero otherwise (from September 1, 2013, until October 31, 2013), on the dummy variable $CAC40_j$, which is equal to one if stock j belongs to the CAC40 index and zero if stock j belongs to the 36 largest non-SLP stocks and on interaction term $Rebate_d \times CAC40_j$. In all regressions, we control for stock and market volatilities, trading volume, market capitalization, and the inverse of price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. The sample is composede of 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 36 largest non-SLP stocks. Data for French stocks come from BEDOFIH database. $^*p$ <0.1; $^{**}p$ <0.05; $^{***}p$ <0.01.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$Rebate_d \times CAC40_j$	-0.038	-0.024	-0.026	-0.026	-0.009	-0.010
	(-0.70)	(-0.32)	(-0.34)	(-0.44)	(-0.11)	(-0.12)
$Rebate_d$	0.021	0.065		-0.008	0.041	
	(0.52)	(0.88)		(-0.20)	(0.52)	
$CAC40_j$	-2.347***			-2.565***		
	(-7.57)			(-7.33)		
$Realized\ volatility_{j,d}$	0.543***	0.185***	0.172***	0.610***	0.207***	0.196***
	(4.59)	(9.47)	(8.29)	(4.40)	(9.57)	(8.45)
$Trading\ volume_{j,d}$	-0.283***	-0.093***	-0.097***	-0.310***	-0.095***	-0.098***
	(-4.03)	(-4.97)	(-5.26)	(-3.86)	(-4.84)	(-5.13)
$Market\ capitalization_{j,d}$	0.018*	-0.002	0.004	0.022*	-0.000	0.004
	(1.83)	(-0.22)	(0.47)	(1.89)	(-0.04)	(0.47)
$Inverse\ of\ price_{j,d}$	7.775**	10.596	8.443	8.585**	11.005	9.138
	(2.24)	(1.41)	(1.14)	(2.12)	(1.49)	(1.25)
$Market\ volatility_d$	-0.005	0.019**		-0.014	0.014	
	(-0.48)	(2.08)		(-1.21)	(1.56)	
$Constant$	3.210***	5.746***	6.138***	3.486***	6.369***	6.660***
	(12.34)	(25.85)	(40.31)	(11.90)	(27.97)	(44.53)
Observations	5,968	5,968	5,968	5,968	5,968	5,968
R^2	0.587	0.918	0.920	0.569	0.920	0.922
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By stock and day			By stock and day		

Figure 1. Timeline.

This figure visualizes the timeline of events discussed in this paper. The sample period ranges from April 1, 2013, until December 31, 2013.

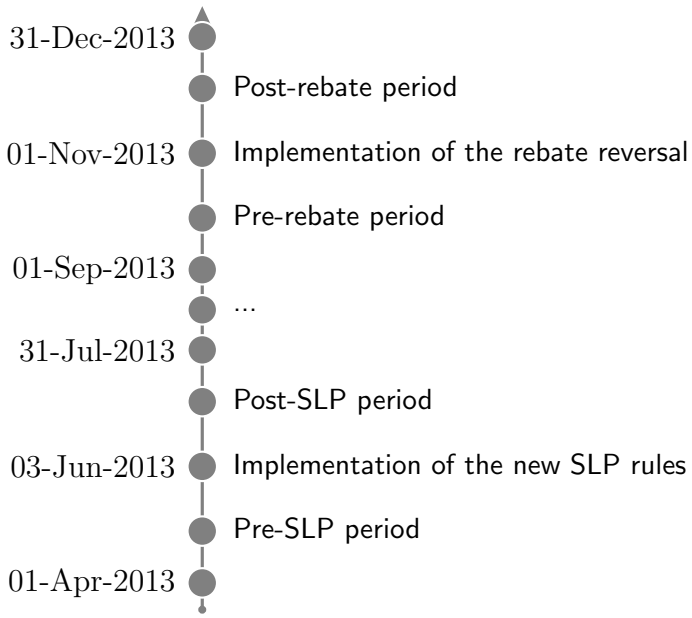


Figure 2. Number of DMMs by basket around the implementation of the new SLP rules.

This figure charts the number of DMMs present in each of the four baskets of stocks in the pre-SLP period (from April 1, 2013, until June 3, 2013) and post-SLP period (from June 3, 2013, until July 31, 2013). We refer readers to the appendix for basket composition details. We note that in the pre-SLP period seven DMMs were active as CAC40 index constituents; in the post-SLP period one new DMM joined the SLP program. Data on the number of DMMs per basket come from AMF.

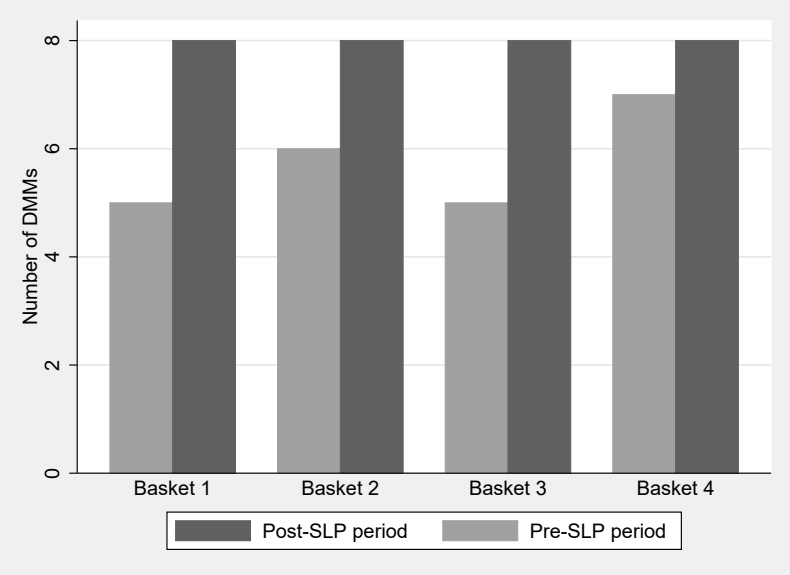


Figure 3. Trader account types.

This figure illustrates the trader account types used in this paper as provided by the BEDOFIH database.

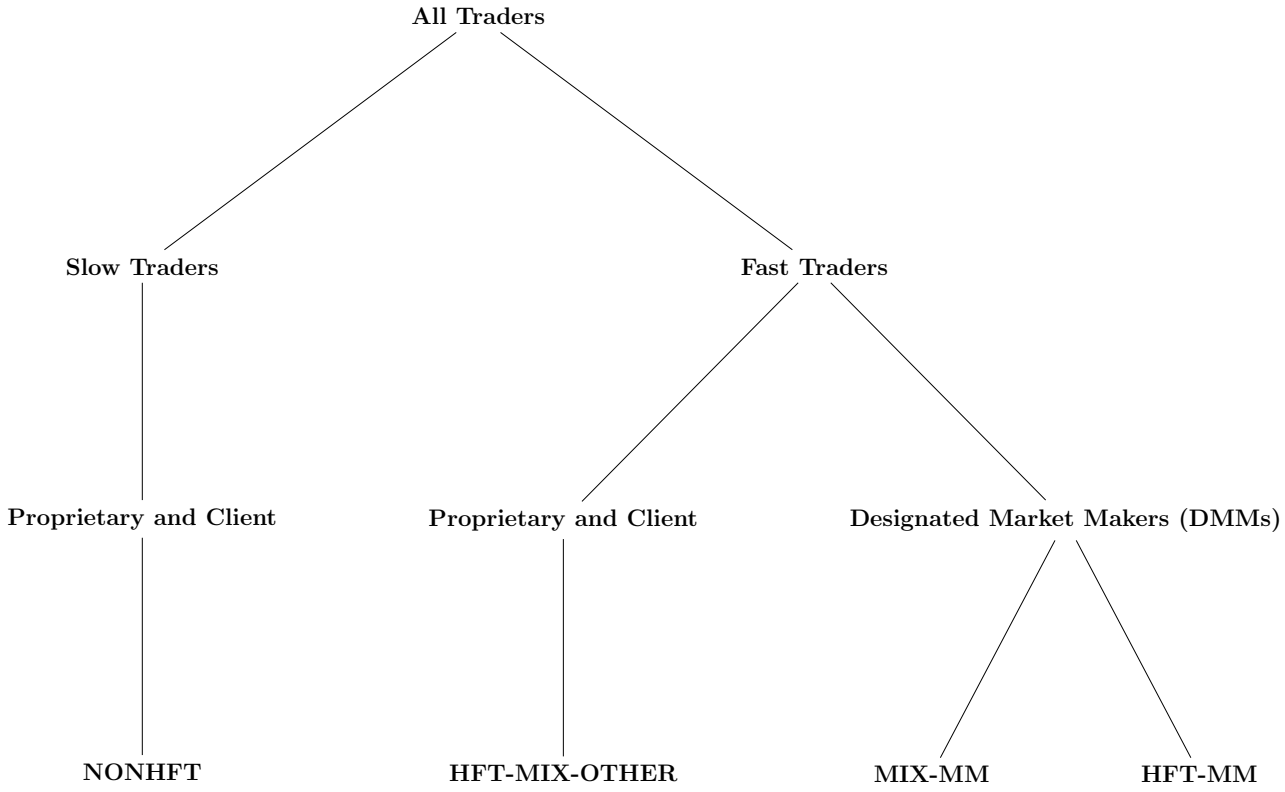
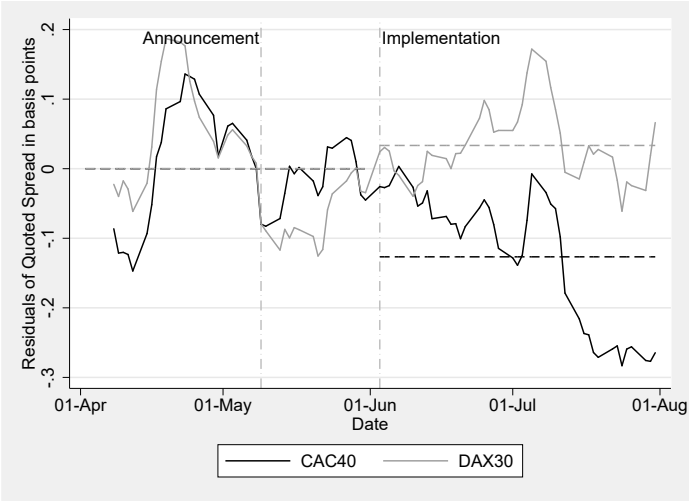


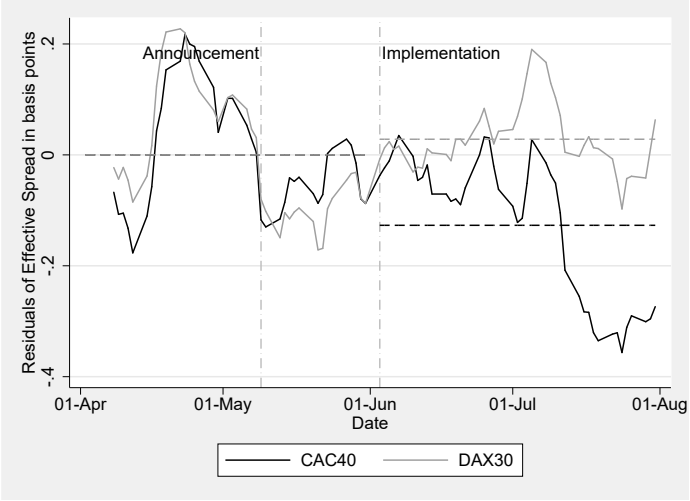
Figure 4. Quoted and effective spreads around the new SLP rules.

This figure shows the weekly moving average of the marketwide residuals of quoted (see Eq. (1)) and effective (see Eq. (2)) spreads in basis points after controlling for stock and market volatilities, market capitalization, trading volume, and the inverse of the stock price. The solid black (gray) line shows the spread dynamics for stocks that belong to the CAC40 (DAX30). For readability, we subtract the pre-SLP average (April 1, 2013, until June 3, 2013) from both time series. The horizontal dashed lines represent the pre-SLP and post-SLP averages of the spreads. The vertical dashed-dotted lines represent the announcement and implementation dates of the new SLP rules. The period under consideration ranges from April 1, 2013, until July 31, 2013. The sample comprises 36 stocks traded on the NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

Panel A: Quoted spread



Panel B: Effective spread



Appendix A Basket composition

In this section, we report the basket composition details in accordance with the old SLP rules. We focus on CAC40 index constituents. New SLP rules assign all CAC40 index constituents to one basket – "basket C."

Table A1 Basket composition.

This table shows CAC40 index constituents used in our analysis, together with the ISIN, industry, and basket to which each stock belongs, as defined by the SLP rules in place before June 3, 2013, together with the average market capitalization in EUR bln, trading volume in EUR mln, and inverse of the stock price in February 2013. Data on stock market capitalization, stock price, and trading volume come from Datastream.

Name	ISIN	Industry	Basket 2012	MCAP, EUR bln	Inverse of price	Trading volume, EUR mln
Total	FR0000120271	Energy	1	95.02	0.03	5.41
Accor	FR0000120404	Consumer discr.	1	6.67	0.03	0.78
Sanofi	FR0000120578	Health care	1	95.63	0.01	3.44
Michelin	FR0000121261	Consumer discr.	1	12.98	0.01	0.94
Schneider	FR0000121972	Industrials	1	31.35	0.02	1.56
Saint-Gobain	FR0000125007	Industrials	1	16.14	0.03	2.29
BNP	FR0000131104	Financials	1	58.08	0.02	4.78
STMicroelectronics	NL0000226223	Information tech.	1	6.05	0.16	3.49
Credit Agricole	FR0000045072	Financials	2	18.80	0.14	14.39
Safran	FR0000073272	Industrials	2	14.22	0.03	0.83
Air Liquide	FR0000120073	Materials	2	29.97	0.01	0.93
Lafarge	FR0000120537	Materials	2	13.16	0.02	1.05
Danone	FR0000120644	Consumer staples	2	32.95	0.02	1.98
Pernod Ricard	FR0000120693	Consumer staples	2	24.96	0.01	0.61
Veolia Environ.	FR0000124141	Utilities	2	4.94	0.11	4.72
Publicis Groupe SA	FR0000130577	Consumer discr.	2	10.33	0.02	0.58
Technip	FR0000131708	Energy	2	9.15	0.01	0.58
EDF	FR0010242511	Utilities	2	26.26	0.08	2.04
Legrand	FR0010307819	Industrials	2	8.89	0.03	0.75
Lvmh Moet Henessy	FR0000121014	Consumer discr.	3	71.07	0.01	0.81
Kering	FR0000121485	Consumer discr.	3	20.60	0.01	0.34
Essilor International	FR0000121667	Health care	3	16.33	0.01	0.61
Vinci	FR0000125486	Industrials	3	21.98	0.03	1.89
Societe Generale	FR0000130809	Financials	3	26.33	0.03	5.63
Renault	FR0000131906	Consumer discr.	3	13.32	0.02	1.36
ENGIE	FR0010208488	Utilities	3	36.59	0.07	4.88
Alstom	FR0010220475	Industrials	3	10.31	0.03	1.05
EADS	NL0000235190	Industrials	3	29.12	0.03	2.15
Carrefour	FR0000120172	Consumer staples	4	14.94	0.05	2.78
L'Oreal	FR0000120321	Consumer staples	4	68.02	0.01	0.65
Vallourec	FR0000120354	Energy	4	5.08	0.04	0.67
Bouygues	FR0000120503	Industrials	4	6.92	0.05	1.79
Axa	FR0000120628	Financials	4	32.97	0.07	7.64
Cap Gemini	FR0000125338	Information tech.	4	5.84	0.03	0.79
Vivendi Universal	FR0000127771	Consumer discr.	4	20.99	0.06	4.28
Orange	FR0000133308	Telecommunication	4	22.17	0.13	11.27

Internet Appendix for

"Designated Market Makers: Competition and Incentives"

This Internet Appendix contains supplementary estimates, statistics, figures and tables that are described and referenced in our paper but were not discussed in detail. The document is structured as follows. In Section IA 1, we analyze potential adverse effects of the forced competition among DMMs due to capacity constraints. In Section IA 2, we present the characteristics of the different types of traders. In Section IA 3, we repeat the main analysis with two different sets of control variables. Section IA 4 provides summary statistics for market liquidity variables by basket of stocks. Section IA 5 provides formal tests for the "parallel trends" assumption between CAC40 and DAX30 index constituents, between CAC40 index constituents and 36 largest non-SLP stocks around the implementation of the new SLP rules and the rebate reversal, respectively. In Section IA 6, we provide the analysis for the effective spread decomposition for different decomposition horizons. In Section IA 7, we examine the effect of the new SLP rules on the NYSE Paris Euronext market share. Finally, in Section IA 8, we report the original documentation from NYSE Euronext regarding the implementation of the SLP program and the subsequent amendments.

IA 1. New SLP Rules: Capacity of DMMs

Rule A combined with Rule B3.3 requires that DMMs have to be present at the best bid-offer level in all CAC40 stocks for at least 10% of the time. These two rules, while increasing competition, also lead to a reallocation of the DMMs' capacity across baskets. In order to analyze the potential effects of the tightened requirements through the need to be present in all baskets, we discuss five hypothetical cases for allocation of DMMs across baskets, before and after the new SLP rules were implemented (see Fig. IA 1.1). We assume that each DMM has a capacity of one unit. Therefore, DMMs present only in one basket allocate that whole unit to that particular basket, and DMMs present in all four baskets allocate 0.25 units to each basket.

Case 1. Four DMMs were present in all baskets in the pre-SLP period. There was no change either in competition among them, or in the total capacity allocated to each basket, after the new SLP rules were in place (no effect on market liquidity).

Case 2. Four DMMs were present in all baskets; in addition, in each basket, there were also four DMMs present. If all DMMs present in one basket decided to leave the market, as they were not able to fulfill the new requirements, then the competition among DMMs would have decreased, but so also would the total capacity allocated to each basket after the new SLP rules were in place (a decrease in market liquidity).

Case 3. Four DMMs were present in all baskets; in addition, in each basket, there were also four DMMs present. DMMs that were present only in Basket 2 and Basket 4 decided to leave the market. Then, the competition among DMMs increased (an increase in market liquidity), while the total capacity allocated to each of the baskets decreased after the new SLP rules were in place (a decrease in market liquidity).

Case 4. Four DMMs were present in all baskets; in addition, in each basket, four DMMs were present. If all DMMs that were present in only one basket decided to stay in the market, then the competition among DMMs would have increased (an increase in market liquidity), while total capacity allocated to each basket would have remained unchanged (no effect on market liquidity), after the new SLP rules were in place.

Case 5. Four DMMs were present in all baskets; in addition, in Baskets 1 and 3 four DMMs were present. If all DMMs that were present in only one basket decided to stay in the market, then the competition among DMMs would have increased (an increase in market liquidity), while the total capacity allocated to each basket would have increased for Baskets 2 and 4 (an increase in market liquidity), and decreased for Baskets 1 and 3 (a decrease in market liquidity).

Overall, Cases 1 to 4 suggest that tightened requirements could not have lead to an improvement in liquidity, while only Case 5 allows for liquidity improvement in some baskets

at the expense of the other baskets, through a reallocation of the DMMs capacity to provide liquidity. We also note that, although the relevant basket of stocks was defined by the NYSE Euronext Paris, traders themselves decided in which basket they wanted to participate as DMMs and, hence, in equilibrium, their allocation should be optimal for them (i.e., DMMs optimally decide which of Cases 1 to 5 is realized).

We also note, that in terms of the SLP rules, one can define the DMMs' capacity to provide liquidity in terms of their time presence at the best bid-offer level, as this is the only requirement that is applied at the individual stock level. According to AMF, seven DMMs were not present in a uniform manner across baskets; therefore, Case 5 is the most likely scenario for the actual effect of capacity reallocation. We also note that none of these cases includes new entrants, as we believe that the effect of the new entrants is purely attributed to the increase in competition among DMMs, rather than to capacity reallocation as a consequence of the tightened requirements.

We measure the DMMs' capacity to provide liquidity in terms of the time presence at the best bid-offer level, as this is the only requirement that is applied at the individual stock level. We also note that, for market liquidity, it matters whether the aggregate capacity to provide liquidity was reallocated from one basket to another rather than to which type of DMMs' it belongs; hence, we analyze changes in the aggregate capacity measure estimated for both HFT-MM and MIX-MM.

We distinguish between stocks for which the changes in the requirements for DMMs imposed under the new SLP rules were, or were not, binding. First, we examine whether the reallocation of the DMMs' capacity occurred across all baskets. We use the time presence at the best bid-offer level as a measure of the DMMs' capacity (jointly for HFT-MM and MIX-MM). We regress the capacity measure on the dummy variable, SLP_d, which is equal to one, in the post-event period (from June 3, 2013 until July 31, 2013), and zero, in the pre-event period (from April 1, 2013 until June 3, 2013), for each of the four baskets of stocks as defined in the pre-SLP period. We note that, due to our data restrictions, the DMMs' capacity can only be estimated for CAC40 stocks (as the BEDOFIH database provides relevant identification flags, while TRTH does not). We estimate all of our regressions with stock fixed effects, and cluster standard errors by stock and day.

$$Capacity_{j,d} = \alpha_j + \beta_1 SLP_d + \Gamma Controls + \epsilon_{j,d} \qquad \text{(IA 1.1)}$$

Figure IA 1.1: New SLP Rules and Capacity of DMMs

This figure shows five possible cases of changes in DMMs' capacity to provide liquidity in four baskets of stocks as a result of the new SLP rules' implementation. Cases are different from each other in terms of how many DMMs were present in all baskets or one basket only in the pre-SLP period and how many of them decide to stay/leave after the new SLP rules were implemented. We assume that all DMMs have the same total capacity to provide liquidity that is equal to one unit.

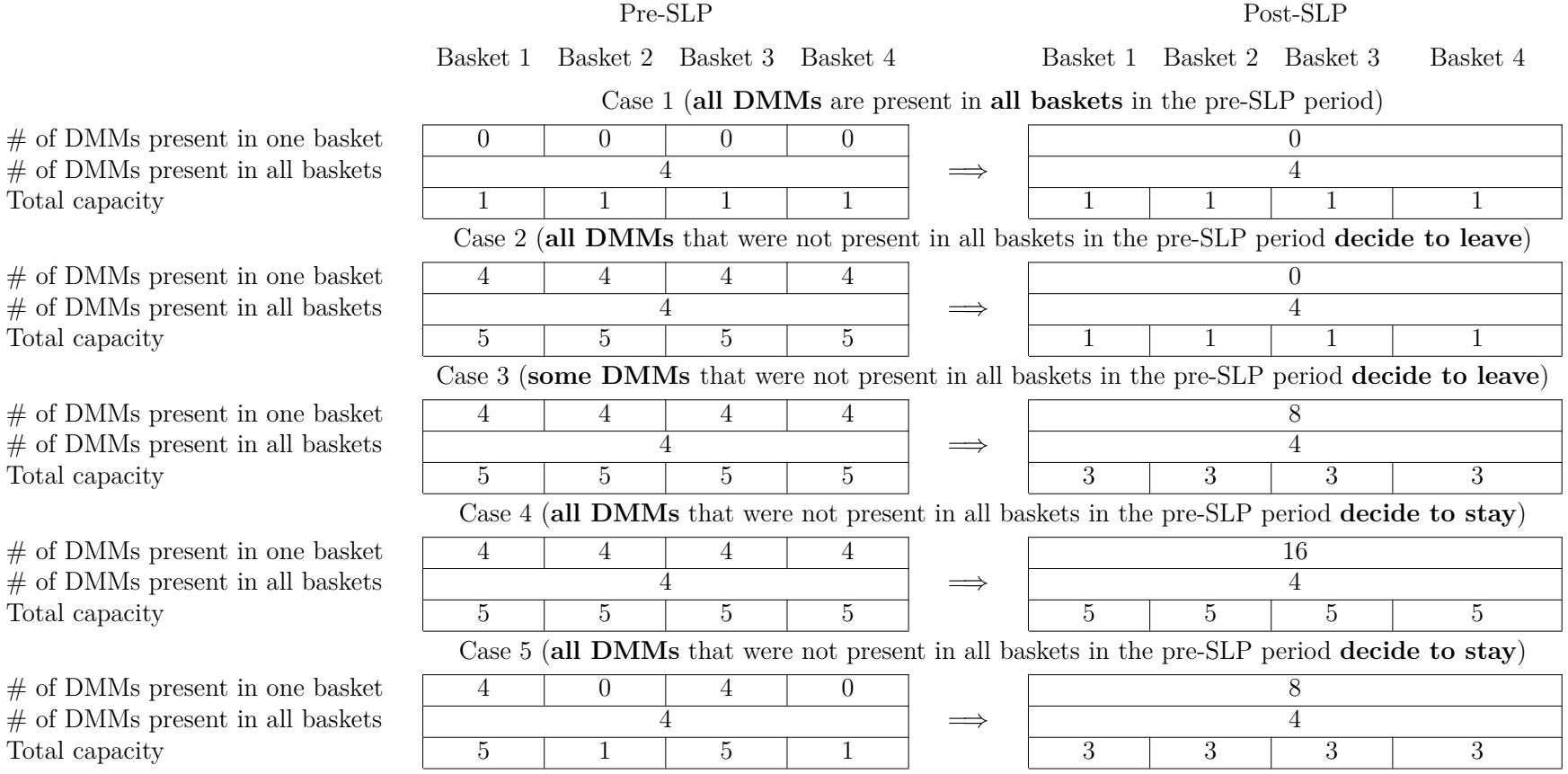


Table IA 1.1 presents the reallocation of the DMMs' capacity across baskets, following the implementation of the new SLP rules (see Eq. (IA 1.1)). In each of the regressions, we control for stock fixed effects, stock and market volatility, trading volume, market capitalization, and the inverse of price of the stock, and cluster standard errors by stock and day.

Table IA 1.1: New SLP Rules: DMMs' Capacity

This table shows the results of DMMs' capacity (jointly for HFT-MM and MIX-MM) reallocation regression, (see Eq. (IA 1.1)) for each of the four baskets of stocks that were in place in the pre-SLP period for details of basket composition). We regress the time presence at the best bid-offer level (amount of seconds present at the best bid-offer level during a continuous trading session) for stock j on day d on the dummy variable, SLP_d, that is equal to one, in the period after the implementation of the new SLP rules (from June 3, 2013 until July 31, 2013), and zero, otherwise (from April 1, 2013 until June 3, 2013). In all regressions, we control for stock and market volatility, trading volume, market capitalization, and the inverse of price. All of our regressions are estimated with stock fixed effects. Standard errors are clustered by stock and by day. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index. Data for the French stocks come from the BEDOFIH database.

	Basket 1	Basket 2	Basket 3	Basket 4
SLP_d	0.013	-0.008	0.025***	-0.005
	(0.97)	(-0.38)	(2.96)	(-0.35)
$Realized\ volatility_{j,d}$	0.010***	0.011**	0.003	0.003
	(3.25)	(2.06)	(1.14)	(0.73)
$Trading\ volume_{j,d}$	-0.013***	-0.025***	-0.013***	-0.012***
	(-2.97)	(-3.52)	(-3.17)	(-2.84)
$Market\ capitalization_{j,d}$	-0.009**	-0.019**	-0.007*	-0.008
	(-2.44)	(-2.27)	(-1.77)	(-1.47)
$Inverse\ of\ price_{j,d}$	0.234	-3.850	1.188	0.521
	(0.20)	(-1.45)	(0.40)	(0.31)
$Market\ volatility_d$	0.003*	0.006	0.001	0.003*
	(1.75)	(1.63)	(0.41)	(1.66)
$Constant$	1.514***	1.621***	1.331***	0.760***
	(4.73)	(3.57)	(4.57)	(6.18)
Observations	680	935	765	680
Adjusted R^2	0.200	0.246	0.672	0.555
Stock FE	Yes	Yes	Yes	Yes
Day FE	No	No	No	No
Clustered SE	By Stock and Day			

We find that the only basket that experienced a statistically significant increase of 2.5% for the duration of the continuous trading session in the presence of the DMMs is Basket 3, while all other baskets did not experience a significant change in the time presence of the DMMs. Therefore, we conclude that DMMs reallocate their capacity from Baskets 1, 2, and 4 to Basket 3 in the post-SLP period, to fulfill the new requirement to be present at least 10% of the time at the best bid-offer level in each of the CAC40 index constituents.

We then regress the different liquidity measures on the dummy variable, SLP_d, which is equal to one, in the post-event period (from June 3, 2013 until July 31, 2013), and zero, in the pre-event period (from April 1, 2013 until June 3, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the DAX30 index, on the dummy variable, $NonBinding_j$, which is equal to one, if stock j belongs to a non-binding basket of stocks (Baskets 1, 2, and 4), on the interaction term between $SLP_d \times CAC40_j$ and on the interaction term $SLP_d \times CAC40_j \times NonBinding_j$.[1] Again, in all regressions, we control for stock and market volatility, trading volume, and market capitalization. We estimate all specifications without fixed effects, with stock fixed effects, and with both stock and day fixed effects. In all of our regressions, we cluster the standard errors by stock and day.

$$\begin{aligned} Liquidity_{j,d} =& \alpha + \beta_1 SLP_d + \beta_2 CAC40_j + \beta_3 NonBinding_j + \beta_4 CAC40_j \times SLP_d + \\ & \beta_5 NonBinding_j \times SLP_d + \Gamma Controls + \epsilon_{j,d} \end{aligned} \tag{IA 1.2}$$

We use the estimation results of Eq. (IA 1.2) to disentangle the effect of tightened requirements from the effect of competition among DMMs based on the following argument. If β_4 and β_5 are both significant, then the pure effect of competition among DMMs on market liquidity is equal to $\beta_4 + \beta_5$, i.e., the effect of changes in the SLP rules for stocks with non-binding requirements. If β_5 is not significant, we conclude that changes in the SLP rules have the same effect on the stocks with binding as well as non-binding requirements and, thus, β_4 represents the effect that increased competition among DMMs has on market liquidity.

Table IA 1.2 presents the results of the regression estimation for the quoted spread (Panel A) and the effective spread (Panel B) as dependent variables. In all regressions, we control for stock and market volatility, trading volume, market capitalization, and inverse of price and cluster standard errors by stock and day. We estimate specifications without fixed effects, with stock fixed effects, and with both stock and day fixed effects. Our findings are consistent across all specifications. In the discussion of the results, we focus on the most conservative specification that includes both stock and day fixed effects.

We observe that the new SLP rules decreased market-wide quoted and effective spreads, as demonstrated by the negative and significant coefficients for the interaction term $SLP_d \times CAC40_j$. In particular, we show that the quoted (effective) spread decreased by 0.199 (0.177) bps. We also document that the coefficient of the interaction term $SLP_d \times CAC40_j \times NonBinding_j$, which represents the differential effect of the new SLP rules across baskets of stocks *from* which DMMs' capacity was reallocated (Baskets 1, 2, and 4), as opposed to the baskets of stocks *to* which DMMs' capacity was reallocated (Basket 3), is not statistically significant in any of our specifications. This leads us to the conclusion that the effect of the new SLP rules on market liquidity was solely driven by the increased competition among the

[1] We note that all stocks for which requirements were not binding belong to the CAC40 index. Consequently, the triple difference-in-difference term $SLP_d \times NonBinding_j$ is exactly the same as the interaction term $SLP_d \times CAC40_j \times NonBinding_j$, and is omitted from the regression estimation due to multicollinearity.

DMMs, rather than effects of the capacity reallocation by DMMs.

Table IA 1.2: New SLP Rules: Market-wide Effect of Competition vs. Incentives

This table shows the results of the SLP regression estimation (see Eq. (IA 1.2)). We regress the quoted (Panel A) and the effective (Panel B) spreads for stock j on day d on the dummy variable, SLP_d, that is equal to one, in the period after the implementation of the new SLP rules (from June 3, 2013 until July 31, 2013), and zero, otherwise (from April 1, 2013 until June 3, 2013), on dummy variable $CAC40_j$, that is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the DAX30 index, on the dummy variable $NonBinding_j$, that is equal to one, if stock j belongs to Baskets 1, 2, and 4 in the pre-SLP period and zero otherwise, on interaction terms $SLP_d \times CAC40_j$, and $SLP_d \times CAC40_j \times NonBinding_j$. In all regressions, we control for stock and market volatility, trading volume, market capitalization, and inverse of price. Standard errors are clustered by stock and by day. Spreads are measured in bps. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.153**	-0.153**	-0.199***	-0.138**	-0.132**	-0.177***
	(-2.50)	(-2.31)	(-3.07)	(-2.29)	(-2.01)	(-2.76)
$SLP_d \times CAC40_j \times NonBinding_j$	0.016	0.014	0.017	0.016	0.015	0.018
	(0.31)	(0.23)	(0.27)	(0.31)	(0.23)	(0.27)
SLP_d	0.014	0.022		0.004	0.005	
	(0.32)	(0.56)		(0.10)	(0.12)	
$CAC40_j$	-0.385**			-0.766***		
	(-2.46)			(-4.77)		
$NonBinding_j$	0.144***	0.093***	0.070***	0.145***	0.092***	0.063***
	(5.57)	(6.72)	(5.23)	(5.31)	(5.63)	(3.75)
$Realized\ volatility_{j,d}$	-0.077***	-0.012*	-0.020***	-0.070***	0.001	-0.007
	(-3.55)	(-1.77)	(-2.77)	(-3.10)	(0.12)	(-0.89)
$Trading\ volume_{j,d}$	-0.007**	-0.016**	-0.020**	-0.008***	-0.009	-0.013
	(-2.42)	(-1.98)	(-2.45)	(-2.71)	(-1.19)	(-1.64)
$Market\ capitalization_{j,d}$	-0.155			-0.152		
	(-1.19)			(-1.13)		
$Inverse\ of\ price_{j,d}$	0.032***	0.037***		0.033***	0.036***	
	(5.02)	(5.99)		(4.60)	(5.89)	
$Market\ volatility_d$	5.157***	-8.213	-8.584	5.234***	-3.756	-4.427
	(3.88)	(-1.08)	(-1.11)	(3.83)	(-0.62)	(-0.69)
$Constant$	1.775***	1.946***	2.696***	2.205***	2.095***	2.821***
	(12.50)	(4.42)	(5.53)	(14.23)	(5.44)	(6.90)
Observations	5,613	5,613	5,613	5,613	5,613	5,613
Adjusted R^2	0.388	0.821	0.844	0.499	0.837	0.858
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		
p-value $SLP_d \times CAC40_j = Rebate$	0.271	0.316	0.748	0.172	0.182	0.504

IA 2. Traders' Characteristics

In Table IA 2.1, we present the traders' characteristics and the trading activity averaged across stock-days for the four trader-account types used in our analysis: HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT for CAC40 index constituents and 36 largest non-SLP stocks.

First, we discuss traders' characteristics for CAC40 stocks. We document that DMMs (HFT-MM and MIX-MM) are responsible for the majority of orders submitted to the market. In line with stylized facts regarding fast traders acting as DMMs, HFT-MM and MIX-MM cancel more than 95% of the orders submitted, as opposed to NONHFT who cancel only 26.6% of the orders submitted. Another metric of HFT activity is how many times trader inventories cross zero. We document that, as a group, HFT-MM's inventory crosses zero, on average, 20 times per stock-day. This is four times larger than the respective number for NONHFT. In terms of liquidity provision, HFT-MM contribute 29.8% to the total volume of passive execution, while MIX-MM contribute only 6.7%. The largest contribution to liquidity provision comes from voluntary liquidity provision by HFT-MIX-OTHER (50.1%). We note that all trader-account types use mixed strategies that involve both liquidity-providing (limit) orders and liquidity-consuming (market) orders. In net terms, HFT-MM are the largest contributors to liquidity: they provide 7.1% more than they consume.

Second, we note that traders' composition is very different for CAC40 index constituents and 36 largest non-SLP stocks. In particular, HFT-MM and MIX-MM who are the most active traders in CAC40 index constituents are not present in non-SLP stocks which is natural given that there is no attractive incentive scheme in place for DMMs in non-SLP stocks. NONHFT traders play a larger role for non-SLP stocks than for CAC40 index constituents: they are responsible for roughly 1/3 of total activity.

Table IA 2.1: Traders' Characteristics

This table shows the averages across stock-days of the number of new orders, the cancellation ratio (number of cancelled orders relative to the total number of new orders submitted by the trader-account type), the number of times inventory crosses zero, liquidity provision (the number of shares executed passively by the trader-account type relative to the total trading volume per stock-day) and liquidity consumption (the number of shares executed aggressively by the trader-account type relative to the total trading volume per stock-day) ratios for the four trader-account types (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NONHFT). The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 36 largest non-SLP stocks. The period under consideration is from April 1, 2013 till July 31, 2013. Data for French stocks come from BEDOFIH database.

	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT
	CAC40			
# of new orders	74,496	59,608	28,967	3,675
Cancellation ratio	96.2%	97.8%	86.8%	26.6%
# of times inventory crosses zero	20	6	8	5
Liquidity provision	29.8%	6.7%	50.1%	13.3%
Liquidity consumption	22.7%	13.9%	45.9%	17.4%
	non-SLP			
# of new orders			15,960	983
Cancellation ratio			93.1%	38.3%
# of times inventory crosses zero			3	3
Liquidity provision			74.1%	25.7%
Liquidity consumption			64.4%	35.4%

IA 3. New SLP rules and rebate reversal: different set of control variables

We perform several robustness checks for the effect of the new SLP rules and rebate reversal for a different set of the control variables compared to the main analysis. First, we exclude trading volume from the list of the control variables as trading volume by itself might have been affected by both the new SLP rules and rebate reversal. Second, we use the share of the total trading volume that is executed on NYSE Euronext Paris as a control variable, instead of the trading volume, to control for market fragmentation.

We estimate the effect of the new SLP rules on market liquidity (see Eq. (8)) with these two different sets of the control variables. In particular, we regress the different liquidity measures on the dummy variable, SLP_d, which is equal to one, in the post-event period (from June 3, 2013 until July 31, 2013), and zero, in the pre-event period (from April 1, 2013 until June 3, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the DAX30 index, on the dummy variable, $Basket123_j$, which is equal to one, if stock j belongs to basket of stocks for which competition among DMMs increased (Baskets 1, 2, and 3), and zero, otherwise, on the interaction term $SLP_d \times CAC40_j$, and on the interaction term $SLP_d \times CAC40_j \times Basket123_j$. Table IA 3.1 presents the results of the regression estimation excluding trading volume from the list of the control variables. Table IA 3.2 presents the results of the regression estimation substituting trading volume with the share of trading volume executed on the NYSE Euronext Paris in the list of the control variables.

We note that, for all regression specifications, changes in competition among DMMs significantly decreases quoted and effective spreads as can be seen from the negative and significant coefficient of $SLP_d \times CAC40_j \times Basket123_j$), while other changes in the SLP rules do not seem to have a tangible impact on market liquidity (insignificant coefficient of $SLP_d \times CAC40_j$). We now estimate the effect of the rebate reversal on market liquidity (see Eq. (9)) with these two different sets of the control variables. In particular, we regress the different liquidity measures on the dummy variable, $Rebate_d$, which is equal to one, in the post-event period (from November 1, 2013 until December 31, 2013), and zero, in the pre-event period (from September 1, 2013 until October 31, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the 36 largest non-SLP stocks (we note that DAX30 does not satisfy parallel trends assumption for the rebate reversal), and the interaction term $Rebate_d \times CAC40_j$. Table IA 3.3 presents the results of the regression estimation excluding trading volume from the list of the control variables. Table IA 3.4 presents the results of the regression estimation substitution trading volume with the share of trading volume executed on the NYSE Euronext Paris in the list of the control variables. We observe that interaction term $Rebate_d \times CAC40_j$ does not show up significantly in any of the regression specifications.

To conclude, using the two different sets of control variables does not change our conclusion either for the effect of the new SLP rules or for the effect of the rebate reversal on market liquidity.

Table IA 3.1: New SLP Rules: Competition vs. Incentives (excluding trading volume from the list of control variables)

This table shows the results of the SLP regression estimation (see Eq. (8)). We regress quoted (Panel A) and effective (Panel B) spreads for stock j, on day d, on the dummy variable, SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013 till July 31, 2013), and zero otherwise (from April 1, 2013 till June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one, if stock j belongs to CAC40 index, and zero, if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one, if stock j belongs to Baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity has increased) in the pre-SLP period, and zero otherwise (see Appendix A for details of basket composition), on the interaction terms $SLP_d \times CAC40_j$, and $SLP_d \times CAC40_j \times Basket123_j$. In all the regressions, we control for stock and market volatility, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.042	-0.036	-0.079	-0.031	-0.018	-0.060
	(-1.17)	(-0.70)	(-1.62)	(-0.93)	(-0.36)	(-1.31)
$SLP_d \times CAC40_J \times Basket123_j$	-0.130***	-0.138***	-0.137***	-0.124***	-0.133***	-0.133***
	(-5.48)	(-2.92)	(-2.88)	(-5.52)	(-2.81)	(-2.74)
SLP_d	0.033	0.024		0.022	0.004	
	(0.83)	(0.62)		(0.55)	(0.10)	
$CAC40_j$	-0.221			-0.621***		
	(-1.36)			(-3.66)		
$Basket123_j$	-0.200			-0.189		
	(-1.40)			(-1.25)		
$Realized\ volatility_{j,d}$	0.118***	0.087***	0.062***	0.123***	0.092***	0.060***
	(4.48)	(7.07)	(5.40)	(4.57)	(6.42)	(3.98)
$Market\ capitalization_{j,d}$	-0.010***	-0.015*	-0.019**	-0.011***	-0.008	-0.011
	(-4.36)	(-1.80)	(-2.23)	(-4.53)	(-0.99)	(-1.43)
$Inverse\ of\ price_{j,d}$	0.189	-8.868	-9.266	0.711	-4.112	-4.905
	(0.15)	(-1.23)	(-1.27)	(0.52)	(-0.70)	(-0.79)
$Market\ volatility_d$	0.028***	0.037***		0.030***	0.036***	
	(4.89)	(6.02)		(4.50)	(5.94)	
$Constant$	1.879***	1.854***	2.538***	2.301***	2.069***	2.746***
	(13.67)	(4.26)	(5.34)	(15.43)	(5.54)	(7.05)
Observations	5,613	5,613	5,613	5,613	5,613	5,613
Adjusted R^2	0.353	0.823	0.844	0.478	0.838	0.859
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.310	0.360	0.945	0.194	0.196	0.606
p-value $SLP_d \times Basket123_j = Rebate$	0.000***	0.085*	0.083*	0.000***	0.067*	0.074*

Table IA 3.2: New SLP Rules: Competition vs. Incentives (controlling for share of trading volume executed on NYSE Euronext Paris)

This table shows the results of the SLP regression estimation (see Eq. (8)). We regress quoted (Panel A) and effective (Panel B) spreads for stock j, on day d, on the dummy variable, SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013 till July 31, 2013), and zero otherwise (from April 1, 2013 till June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one, if stock j belongs to CAC40 index, and zero, if stock j belongs to DAX30 index, on the dummy variable $Basket123_j$, which is equal to one, if stock j belongs to Baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity has increased) in the pre-SLP period, and zero otherwise (see Appendix A for details of basket composition), on the interaction terms $SLP_d \times CAC40_j$, and $SLP_d \times CAC40_j \times Basket123_j$. In all the regressions, we control for stock and market volatility, share of trading volume executed on NYSE Euronext Paris, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$SLP_d \times CAC40_j$	-0.038	-0.032	-0.075	-0.025	-0.011	-0.053
	(-1.01)	(-0.61)	(-1.50)	(-0.72)	(-0.23)	(-1.15)
$SLP_d \times CAC40_J \times Basket123_j$	-0.130***	-0.139***	-0.137***	-0.124***	-0.133***	-0.133***
	(-5.28)	(-2.94)	(-2.91)	(-5.38)	(-2.86)	(-2.79)
SLP_d	0.029	0.020		0.016	-0.003	
	(0.72)	(0.49)		(0.40)	(-0.08)	
$CAC40_j$	-0.193			-0.597***		
	(-1.20)			(-3.56)		
$Basket123_j$	-0.203			-0.191		
	(-1.45)			(-1.30)		
$Realized\ volatility_{j,d}$	0.120***	0.086***	0.062***	0.125***	0.091***	0.059***
	(4.56)	(7.16)	(5.48)	(4.67)	(6.52)	(4.01)
$Euronext\ share_{j,d}$	-0.010***	-0.015*	-0.019**	-0.010***	-0.007	-0.011
	(-4.26)	(-1.88)	(-2.39)	(-4.45)	(-1.01)	(-1.53)
$Market\ capitalization_{j,d}$	0.115	-9.257	-9.652	0.569	-4.068	-4.838
	(0.09)	(-1.34)	(-1.39)	(0.42)	(-0.72)	(-0.80)
$Inverse\ of\ price_{j,d}$	0.016	0.108*	0.104*	0.073	0.154**	0.145**
	(0.06)	(1.79)	(1.78)	(0.28)	(2.21)	(2.32)
$Market\ volatility_d$	0.028***	0.036***		0.029***	0.035***	
	(4.65)	(5.95)		(4.25)	(5.75)	
$Constant$	1.846***	1.825***	2.513***	2.243***	1.999***	2.674***
	(9.69)	(4.42)	(5.64)	(11.35)	(5.63)	(7.31)
Observations	5,441	5,441	5,441	5,441	5,441	5,441
Adjusted R^2	0.346	0.818	0.841	0.466	0.832	0.855
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		
p-value $SLP_d \times CAC40_j + SLP_d \times Basket123_j = Rebate$	0.274	0.325	0.876	0.155	0.156	0.511
p-value $SLP_d \times Basket123_j = Rebate$	0.000***	0.085*	0.080*	0.000***	0.063*	0.068*

Table IA 3.3: Rebate reversal: Market-Wide Liquidity (excluding trading volume from the list of control variables)

This table shows the results of the rebate reversal regression estimation (see Eq. (9)). We regress the quoted (Panel A) and the effective (Panel B) spreads for stock j on day d on the dummy variable, $Rebate_d$, which is equal to one, in the period after the implementation of the rebate reversal rules (from November 1, 2013 until December 31, 2013), and zero otherwise (from September 1, 2013 until October 31, 2013), on the dummy variable $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index, and zero, if stock j belongs to the 36 largest non-SLP stocks, and on interaction term $Rebate_d \times CAC40_j$. In all regressions, we control for stock and market volatility, market capitalization, and the inverse of price. Standard errors are clustered by stock and by day. Spreads are measured in bps. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 36 largest non-SLP stocks. Data for the French stocks come from the BEDOFIH database.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$Rebate_d \times CAC40_j$	-0.006	-0.019	-0.020	0.010	-0.004	-0.005
	(-0.13)	(-0.24)	(-0.27)	(0.21)	(-0.04)	(-0.06)
$Rebate_d$	0.025	0.066		-0.004	0.042	
	(0.61)	(0.89)		(-0.10)	(0.52)	
$CAC40_j$	-2.795***			-3.055***		
	(-7.55)			(-7.30)		
$Realized\ volatility_{j,d}$	0.465***	0.160***	0.148***	0.525***	0.182***	0.172***
	(3.94)	(8.58)	(7.19)	(3.82)	(8.78)	(7.43)
$Market\ capitalization_{j,d}$	0.013	0.001	0.006	0.016	0.002	0.007
	(1.28)	(0.12)	(0.84)	(1.36)	(0.30)	(0.84)
$Inverse\ of\ price_{j,d}$	3.237	9.754	7.515	3.613	10.146	8.200
	(1.03)	(1.26)	(0.99)	(0.99)	(1.33)	(1.09)
$Market\ volatility_d$	0.000	0.021**		-0.008	0.015*	
	(0.01)	(2.18)		(-0.78)	(1.69)	
$Constant$	3.416***	5.748***	6.201***	3.712***	6.371***	6.723***
	(12.97)	(25.86)	(39.30)	(12.66)	(28.02)	(43.14)
Observations	5,968	5,968	5,968	5,968	5,968	5,968
Adjusted R^2	0.554	0.917	0.919	0.537	0.920	0.921
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		

Table IA 3.4: Rebate reversal: Market-Wide Liquidity (controlling for share of trading volume executed on NYSE Euronext Paris)

This table shows the results of the rebate reversal regression estimation (see Eq. (9)). We regress the quoted (Panel A) and the effective (Panel B) spreads for stock j on day d on the dummy variable, $Rebate_d$, which is equal to one, in the period after the implementation of the rebate reversal rules (from November 1, 2013 until December 31, 2013), and zero otherwise (from September 1, 2013 until October 31, 2013), on the dummy variable $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index, and zero, if stock j belongs to the 36 largest non-SLP stocks, and on interaction term $Rebate_d \times CAC40_j$. In all regressions, we control for stock and market volatility, share of trading volume executed on NYSE Euronext Paris, market capitalization, and the inverse of price. Standard errors are clustered by stock and by day. Spreads are measured in bps. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 36 largest non-SLP stocks. Data for the French stocks come from the BEDOFIH database.

	Panel A: Quoted spread			**Panel B: Effective spread**		
	(1)	(2)	(3)	(1)	(2)	(3)
$Rebate_d \times CAC40_j$	-0.022	-0.031	-0.032	-0.013	-0.024	-0.025
	(-0.40)	(-0.40)	(-0.42)	(-0.22)	(-0.29)	(-0.30)
$Rebate_d$	0.003	0.066		-0.014	0.049	
	(0.04)	(0.89)		(-0.14)	(0.61)	
$CAC40_j$	-2.558***			-2.763***		
	(-7.45)			(-7.25)		
$Realized\ volatility_{j,d}$	0.419***	0.157***	0.147***	0.464***	0.175***	0.166***
	(3.78)	(8.17)	(6.90)	(3.68)	(8.34)	(7.11)
$Euronext\ share_{j,d}$	0.007	0.002	0.007	0.009	0.004	0.008
	(0.84)	(0.21)	(0.77)	(0.92)	(0.47)	(0.88)
$Market\ capitalization_{j,d}$	5.083	12.922	9.350	5.714	14.292	11.032
	(1.40)	(1.13)	(0.82)	(1.37)	(1.25)	(0.96)
$Inverse\ of\ price_{j,d}$	-0.554	-0.134	-0.205	-0.516	-0.142	-0.211
	(-0.46)	(-0.84)	(-1.22)	(-0.38)	(-0.80)	(-1.11)
$Market\ volatility_d$	0.002	0.018*		-0.005	0.013	
	(0.19)	(1.96)		(-0.56)	(1.43)	
$Constant$	3.655***	5.689***	6.193***	3.904***	6.253***	6.657***
	(4.55)	(20.72)	(22.80)	(4.39)	(21.46)	(23.62)
Observations	5,807	5,807	5,807	5,807	5,807	5,807
Adjusted R^2	0.584	0.914	0.917	0.570	0.918	0.920
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		

IA 4. Summary statistics for market liquidity by basket of stocks

Table IA 4.1 shows summary statistics for quoted and effective spreads by basket of stocks in our sample period. We focus our attention on the two months before (the pre-SLP period, Panel A) and two months after (the post-SLP period, Panel B) the implementation date of the new SLP rules – June 3, 2013. Basket 1 is the most liquid basket of stocks, while Basket 4 is the least liquid basket of stocks with quoted (effective) spread of 1.84 (1.90) and 2.21 (2.28) bps in the pre-SLP period, respectively.[2] According to AMF, all seven DMMs were present in Basket 4 in the pre-SLP period, presumably, because this basket provides more profitable opportunities for market-making business than other baskets.

Table IA 4.1: Summary Statistics by Basket: Spreads around New SLP Rules

This table shows the average across stock-days of quoted (see Eq. (1)) and effective (see Eq. (2)) spreads in basis points for the market as a whole, as well as for each basket of stocks as defined in the pre-SLP period (we refer to Appendix A for the details of basket composition). Panel A reports summary statistics for the two months before the implementation of the new SLP rules (from April 1, 2013 until June 3, 2013). Panel B reports the summary statistics for the two months after the implementation of the new SLP rules (from June 3, 2013 until July 31, 2013). Panel C provides a univariate t-test with standard errors clustered by stock and by day, for the mean difference between pre-SLP and post-SLP periods. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index, and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

	French stocks					German stocks
	CAC40	Basket 1	Basket 2	Basket 3	Basket 4	DAX30
	Panel A: Pre-SLP period					
Quoted Spread	2.02	1.84	1.96	2.10	2.21	2.07
Effective Spread	2.09	1.90	2.04	2.16	2.28	2.51
	Panel B: Post-SLP period					
Quoted Spread	1.92	1.72	1.80	1.98	2.21	2.15
Effective Spread	1.99	1.79	1.88	2.04	2.28	2.59
	Panel C: Difference					
Quoted Spread	-0.107***	-0.123**	-0.163**	-0.123**	0.004	0.086**
Effective Spread	-0.103***	-0.110**	-0.162**	-0.119**	0.005	0.079**

Panel C of Table IA 4.1 reports difference-in-means test for the changes between pre-SLP and post-SLP periods. In line with our expectations, only Baskets 1, 2, and 3 (baskets that experience a large increase in number of DMMs) exhibit statistically significant decrease in quoted (effective) spreads of -0.123 (-0.110), -0.163 (-0.162), and -0.123 (-0.119) bps, respectively. At the same time, liquidity in Basket 4 remains unchanged (both in statistical and economic terms).

[2]We base our main conclusions on the most conservative regression specifications with stock and day fixed effects. Therefore, the difference in liquidity levels across baskets is not going to affect our results.

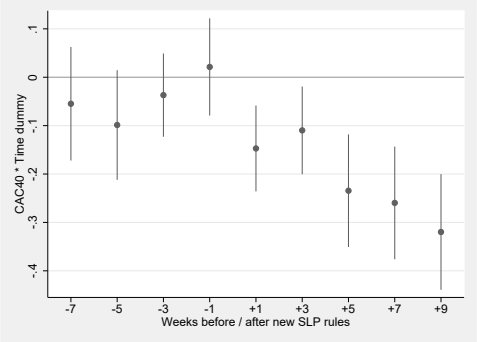
IA 5. Parallel trends assumption

Fig. IA 5.1 presents the results of the formal test of the parallel trends assumption between quoted and effective spreads of CAC40 and DAX30 index constituents and between quoted and effective spreads of CAC40 and 36 largest non-SLP stocks around the implementation of the new SLP rules. We note that both DAX30 index constituents and 36 largest non-SLP stocks constitute a reasonable control group as parallel trends assumption is not violated.

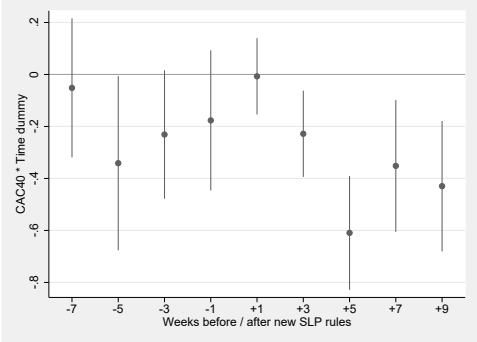
Figure IA 5.1: New SLP rules: Parallel trends in market liquidity

This figure depicts the coefficient estimates and the confidence intervals from the regression with stock and day fixed effects of market liquidity, on the interaction between the (biweekly) time dummies and a dummy variable, $CAC40_j$, which is equal to one, if stocks belong to the CAC40 index, and zero otherwise. The period under consideration is from April 1, 2013 until July 31, 2013. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index, 36 largest non-SLP stocks, and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

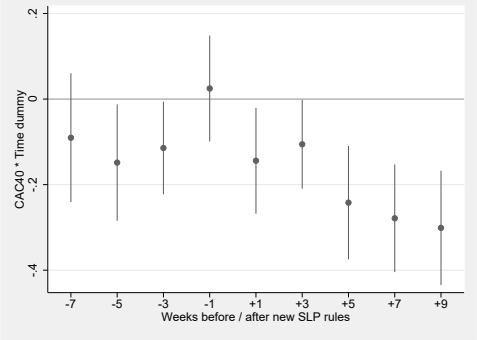
Panel A: Quoted spread DAX30 as a control group



Panel B: Quoted spread non-SLP as a control group



Panel C: Effective spread DAX30 as a control group



Panel D: Effective spread non-SLP as a control group

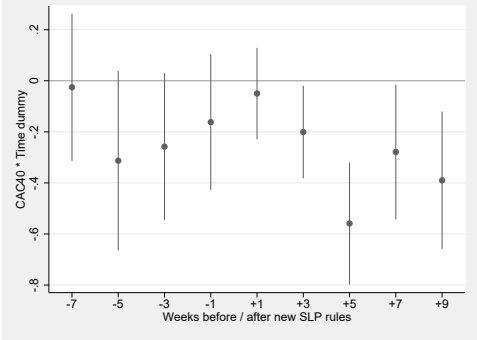
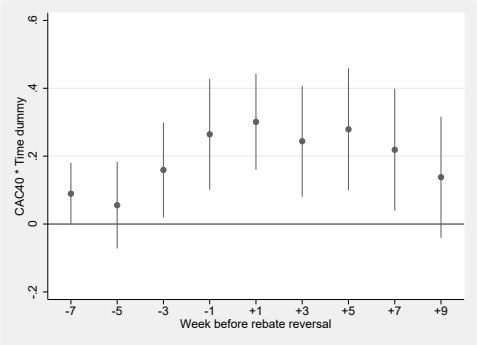


Fig. IA 5.2 presents the results of the formal test of the parallel trends assumption between quoted and effective spreads of CAC40 and DAX30 index constituents and between quoted and effective spreads of CAC40 and 36 largest non-SLP stocks around the implementation of rebate reversal. We note that this assumption is violated for DAX30 index constituents, while it holds for the 36 largest non-SLP stocks. Therefore, for the rebate reversal event, only non-SLP stocks are used as a control group.

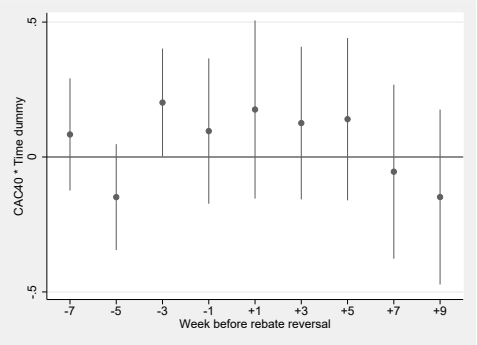
Figure IA 5.2: Rebate reversal: Parallel trends in market liquidity

This figure depicts the coefficient estimates and the confidence intervals from the regression with stock and day fixed effects of market liquidity, on the interaction between the (biweekly) time dummies and a dummy variable, $CAC40_j$, which is equal to one, if stocks belong to the CAC40 index, and zero otherwise. The period under consideration is from September 1, 2013 until December 31, 2013. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index, 36 largest non-SLP stocks, and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

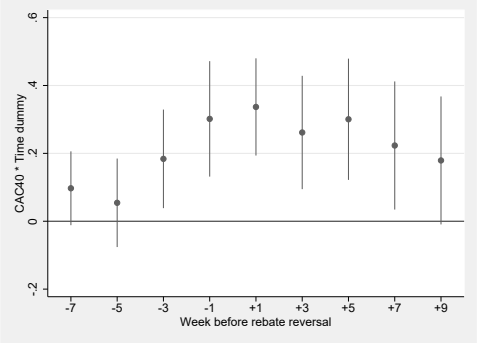
Panel A: Quoted spread DAX30 as a control group



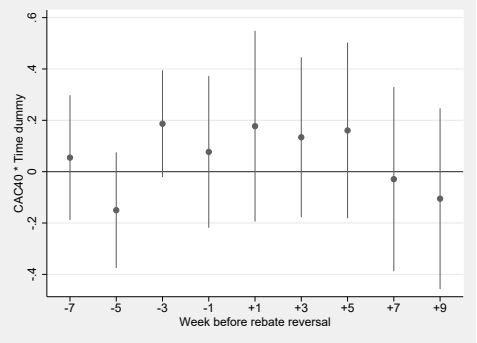
Panel B: Quoted spread non-SLP as a control group



Panel C: Effective spread DAX30 as a control group



Panel D: Effective spread non-SLP as a control group



IA 6. New SLP Rules: Spread Decomposition at different decomposition horizons

Table IA 6.1 provides the summary statistics for the effective spread decomposition into realized spread and price impact components, based on one-second, 10-seconds, one-minute and 5-minutes horizons for the pre-SLP (from April 1, 2013 until June 3, 2013) and post-SLP (from June 3, 2013 until July 31, 2013) periods. During the pre-SLP period (see Panel A of Table IA 6.1), the market-wide realized spread for the CAC40 index constituents is negative, ranging between -0.09 to -0.33 bps, depending on the horizon under consideration. The realized spread for the DAX30 index constituents is also negative, ranging from -0.05 to -0.22 bps, with the only exception being the realized spread at the 1-second horizon (0.20 bps) in the pre-SLP period. Market-wide adverse selection costs are captured by the price impact of the trade, and range between 2.22 to 2.45 bps during the pre-SLP period for CAC40 index constituents. The price impact for the DAX30 index constituents is of comparable magnitude, ranging from 2.35 to 2.80 bps in the pre-SLP period.

We now move to a formal test of the effect of the new SLP rules on the effective spread decomposition, and estimate Eq. (8) with the realized spread and price impact components of the effective spreads as dependent variables. In particular, we regress the different liquidity measures on the dummy variable, SLP_d, which is equal to one, in the post-event period (from June 3, 2013 until July 31, 2013), and zero, in the pre-event period (from April 1, 2013 until June 3, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the DAX30 index, on the dummy variable, $Basket123_j$, which is equal to one, if stock j belongs to basket of stocks for which competition among DMMs increased (Baskets 1, 2, and 3) and zero otherwise, on the interaction term $SLP_d \times CAC40_j$, and on the interaction term $SLP_d \times CAC40_j \times Basket123_j$. Table IA 6.2 presents the results of the regression estimation. In each of the regressions, we control for stock and market volatility, trading volume, market capitalization, and inverse of price of the stock and cluster standard errors by stock and day. For brevity, we report only the coefficients of $SLP_d \times CAC40_j$ and $SLP_d \times CAC40_j \times Basket123_j$ for the specification that includes both stock and day fixed effects.

The pure effect of competition among DMMs manifests itself in the coefficient of $SLP_d \times CAC40_j \times Basket123_j$. Table IA 6.2 shows that competition among DMMs decreases significantly the realized spread at the 1-second decomposition horizon for all trader categories except, HFT-MIX-OTHER, with the most profound decrease of 0.239 bps for the transactions initiated by NONHFT traders. The decrease in the realized spread, which is frequently interpreted as the revenue of the liquidity provider (net of adverse selection costs), is in line with what one might expect with an increase in competition among DMMs. Table IA 6.2 also reveals that the price impact component of the effective spread decreased significantly due to the pure effect of competition among DMMs at the 1-min and 5-min decomposition horizon at the market-wide level, with this effect stemming purely from the transactions initiated by HFT-MM. Overall, new SLP rules ($SLP_d \times CAC40_j + SLP_d \times CAC40_j \times Basket123_j$) at the market-wide level have a consistent effect on the realized spread at 1-second, 10-second ad 1-minute horizons, while market-wide effect on the price impact shows up only at the

Table IA 6.1: Summary Statistics: Spread Decomposition

This table shows the average across stock-days of the realized spread (see Eq. (3)) and the price impact (see Eq. (4)) components of the effective spread in bps for the market as a whole as well as the spreads faced by each trader-account type (HFT-MM, MIX-MM, HFT-MIX-OTHER, and NON-HFT) while initiating the transaction for the one-second, 10-seconds, one-minute and five-minutes horizons. Panel A reports the summary statistics for the two months before the announcement of the new SLP rules (from April 1, 2013 until June 3, 2013). Panel B reports the summary statistics for the two months after the implementation of the new SLP rules (from June 3, 2013 until July 31, 2013). The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to the DAX30 index. Data for the French stocks come from the BEDOFIH database. Data for the German stocks come from the TRTH database.

	French stocks					German stocks
	CAC40	HFT-MM	MIX-MM	HFT-MIX-OTHER	NONHFT	DAX30
Panel A: Pre-SLP period						
Realized spread 1 sec	-0.09	-0.71	-0.52	0.01	1.06	0.20
Realized spread 10 sec	-0.31	-0.91	-0.67	-0.22	0.84	-0.10
Realized spread 1 min	-0.33	-0.81	-0.51	-0.30	0.80	-0.22
Realized spread 5 min	-0.21	-0.60	-0.19	-0.26	0.89	-0.05
Price impact 1 sec	2.22	2.56	2.47	2.09	1.74	2.35
Price impact 10 sec	2.43	2.76	2.61	2.31	1.97	2.65
Price impact 1 min	2.45	2.67	2.47	2.40	2.02	2.80
Price impact 5 min	2.34	2.46	2.15	2.36	1.93	2.66
Panel B: Post-SLP period						
Realized spread 1 sec	-0.12	-0.61	-0.50	0.08	1.01	0.26
Realized spread 10 sec	-0.30	-0.79	-0.61	-0.10	0.85	0.01
Realized spread 5 min	-0.29	-0.75	-0.41	-0.14	0.84	-0.07
Realized spread 1 min	-0.15	-0.53	0.24	-0.12	0.87	0.03
Price impact 1 sec	2.14	2.39	2.42	1.96	1.68	2.37
Price impact 10 sec	2.31	2.57	2.52	2.14	1.84	2.63
Price impact 1 min	2.30	2.53	2.32	2.18	1.86	2.74
Price impact 5 min	2.16	2.31	1.67	2.16	1.83	2.66

5-minute horizon.[3] To conclude, at the market-wide level, the decrease in the realized spread component of the effective spread is the main driver of the decrease in the effective spread after implementation of the new SLP rules consistent with decreased revenue from liquidity provision due to increased competition among DMMs.

[3]In the unreported results, we show that at the market-wide level the overall effect of new SLP rules ($SLP_d \times CAC40_j + SLP_d \times CAC40_j \times Basket123_j$) on realized spreads (price impact) is negative and statistically significant at 5% level at 1-second, 10-second ad 1-minute horizons (5-minute horizons).

Table IA 6.2: New SLP Rules: Spread Decomposition

This table shows the results of the SLP regression estimation for the spread (see Eq. (3)) and the price impact (see Eq. (4)) components of the effective spread (see Eq. (8)). We regress the realized spread and price impact components of the effective spread for stock j on day d on the interaction between dummy variable, SLP_d, that is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013 till July 31, 2013) and zero otherwise (from April 1, 2013 till June 3, 2013), on dummy variable $CAC40_j$, that is equal to one if stock j belongs to CAC40 index and zero if stock j belongs to DAX30 index, and interaction between dummy variable $Basket123_j$, that is equal to one if stock j belongs to Baskets 1, 2, and 3 (baskets of stocks for which DMMs' activity has increased) in the pre-SLP period and zero otherwise (see Appendix A for details of basket composition), $CAC40_j$, and SLP_d. In all regressions, we control for stock volatility, trading volume, and market capitalization, and inverse of price. For brevity, we report only coefficients in front of the interaction terms for the specifications with both stock and day fixed effects. Standard errors are clustered by stock and by day. Spreads are measured in basis points. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database.

	$SLP_d \times CAC40_j$					$SLP_d \times CAC40_j \times Basket123_j$				
	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT	Market	HFT-MM	MIX-MM	HFT-MIX-OTH	NONHFT
Realized spread 1 sec	0.004	0.155***	0.030	0.025	0.068	-0.135***	-0.171***	-0.118***	-0.034	-0.239***
	(0.12)	(4.50)	(0.56)	(0.50)	(0.98)	(-3.87)	(-4.99)	(-2.99)	(-0.70)	(-3.75)
Realized spread 10 sec	-0.093**	-0.010	-0.090	-0.025	0.017	-0.038	-0.015	0.006	0.024	-0.173***
	(-2.28)	(-0.19)	(-1.23)	(-0.49)	(0.23)	(-1.06)	(-0.35)	(0.10)	(0.49)	(-2.67)
Realized spread 1 min	-0.151**	-0.187**	-0.128	-0.032	-0.059	0.012	0.073	0.040	0.026	-0.095
	(-2.31)	(-2.31)	(-1.02)	(-0.43)	(-0.54)	(0.20)	(1.00)	(0.35)	(0.36)	(-0.95)
Realized spread 5 min	-0.068	-0.127*	0.239	0.013	-0.069	0.026	0.097*	0.104	0.020	-0.094
	(-0.97)	(-1.80)	(1.11)	(0.13)	(-0.49)	(0.45)	(1.69)	(0.51)	(0.21)	(-0.65)
Price impact 1 sec	-0.076*	-0.210***	-0.046	-0.048	-0.103*	0.007	0.059	0.011	-0.089**	0.064
	(-1.65)	(-3.36)	(-0.61)	(-0.94)	(-1.81)	(0.17)	(0.94)	(0.18)	(-2.31)	(1.46)
Price impact 10 sec	0.017	-0.044	0.089	0.007	-0.048	-0.095	-0.094	-0.125	-0.148***	-0.009
	(0.26)	(-0.51)	(0.89)	(0.11)	(-0.66)	(-1.61)	(-1.15)	(-1.46)	(-2.76)	(-0.15)
Price impact 1 min	0.072	0.142	0.103	0.009	0.016	-0.144*	-0.192*	-0.155	-0.134*	-0.073
	(0.82)	(1.25)	(0.71)	(0.10)	(0.15)	(-1.79)	(-1.82)	(-1.14)	(-1.70)	(-0.80)
Price impact 5 min	0.002	0.089	-0.268	-0.022	0.027	-0.169**	-0.222***	-0.206	-0.155	-0.076
	(0.02)	(1.00)	(-1.20)	(-0.20)	(0.18)	(-2.30)	(-2.69)	(-0.99)	(-1.56)	(-0.55)
Controls	Yes									
Stock FE	Yes									
Day FE	Yes									
Clustered SE	By Stock and Day									

IA 7. New SLP Rules: NYSE Paris Euronext market share

In this section we investigate the effect of the new SLP rules on the share of trading volume executed on NYSE Euronext Paris. In particular, we regress the share of trading volume executed on NYSE Euronext Paris (market share) on the dummy variable, SLP_d, which is equal to one, in the post-event period (from June 3, 2013 until July 31, 2013), and zero, in the pre-event period (from April 1, 2013 until June 3, 2013), on the dummy variable, $CAC40_j$, which is equal to one, if stock j belongs to the CAC40 index and zero, if stock j belongs to the DAX30 index (or to the 36 largest non-SLP stocks), and on the interaction term $SLP_d \times CAC40_j$. We estimate our regression without fixed effects, with stock fixed effects, and with stock and day fixed effects. In all our regressions we control for stock and market volatility, market capitalization, and the inverse of price of the stock. We cluster standard errors by stock and day. Table IA 7.1 reports estimation results.

We note that, independently of the control group used (either DAX30 index constituents or the 36 largest non-SLP stocks), we do not find any tangible effect of the new SLP rules on the share of the trading volume executed on NYSE Euronext Paris, which can be seen from the insignificant coefficient of the interaction term $SLP_d \times CAC40_j$.

Table IA 7.1: New SLP Rules: NYSE Euronext Paris market share

This table shows the effect of the new SLP rules on the NYSE Euronext Paris market share. We regress market share for stock j, on day d, on the dummy variable, SLP_d, which is equal to one in the period after the implementation of the new SLP rules (from June 3, 2013 till July 31, 2013), and zero otherwise (from April 1, 2013 till June 3, 2013), on the dummy variable $CAC40_j$, which is equal to one, if stock j belongs to CAC40 index, and zero, if stock j belongs to DAX30 index or to 36 largest non-SLP stocks, on the interaction term $SLP_d \times CAC40_j$. In all the regressions, we control for stock and market volatility, market capitalization, and the inverse of the stock price. Standard errors are clustered by stock and by day. t-statistics are reported in parentheses. ***, **, * corresponds to statistical significance at 1%, 5%, and 10%, respectively. The sample is composed of 36 stocks traded on NYSE Euronext Paris that belong to the CAC40 index, 36 largest non-SLP stocks, and 30 stocks that belong to DAX30 index. Data for French stocks come from BEDOFIH database. Data for German stocks come from TRTH database.

	(1)	(2)	(3)	(4)	(5)	(6)
$SLP_d \times CAC40_j$	0.001	0.002	-0.003	0.010	0.012	0.012
	(0.07)	(0.19)	(-0.29)	(1.06)	(1.16)	(1.14)
SLP_d	0.013	0.012		0.002	0.002	
	(1.40)	(1.27)		(0.26)	(0.22)	
$CAC40_j$	0.012			-0.023		
	(0.80)			(-0.73)		
$Realized\ volatility_{j,d}$	0.006	0.007***	0.007***	-0.006	0.001	0.001
	(1.59)	(2.74)	(3.53)	(-1.30)	(0.61)	(0.59)
$Market\ capitalization_{j,d}$	-0.000	-0.001	-0.001	-0.001	-0.000	-0.000
	(-0.28)	(-0.38)	(-0.47)	(-1.46)	(-0.04)	(-0.17)
$Inverse\ of\ price_{j,d}$	0.004**	0.003**		0.005***	0.003**	
	(2.09)	(2.05)		(3.59)	(2.55)	
$Market\ volatility_d$	0.076	0.072	-0.163	-0.149	0.008	0.080
	(0.21)	(0.11)	(-0.26)	(-0.43)	(0.01)	(0.08)
$Constant$	0.499***	0.462***	0.571***	0.587***	0.703***	0.779***
	(17.03)	(4.99)	(5.74)	(28.15)	(30.07)	(30.54)
Observations	5,441	5,441	5,441	5,950	5,950	5,950
Adjusted R^2	0.030	0.419	0.472	0.102	0.588	0.606
Control group	DAX30	DAX30	DAX30	NON-SLP	NON-SLP	NON-SLP
Stock FE	No	Yes	Yes	No	Yes	Yes
Day FE	No	No	Yes	No	No	Yes
Clustered SE	By Stock and Day			By Stock and Day		

IA 8. SLP Documentations

In this section, we report the original documentation from NYSE Euronext regarding the implementation of the SLP program and the subsequent amendments.

13 January 2011

PROJECT: **Supplemental Liquidity Provider programme**

Launch of a Supplemental Liquidity Provider programme on European blue chips

Executive Summary

NYSE Euronext will introduce a Supplemental Liquidity Provider (SLP) programme on European blue chips listed on its Regulated Cash Markets from 1 March 2011. Potential candidates must fulfil eligibility criteria and commit to provide liquidity for specific baskets of blue-chip securities. The completed application form should be returned to NYSE Euronext before Monday 14 February 2011.

NYSE Euronext is enhancing its European market design by introducing Supplemental Liquidity Providers (SLPs) to the market. This new liquidity provision programme will enable NYSE Euronext to reinforce its liquidity offer on blue-chip securities traded on the regulated markets.[i]

A limited number of participants will be selected as special partners in the new SLP programme and a unique dedicated tariff will apply on their SLP-flagged trading activity. The programme will be implemented on **1 March 2011.**

Scope of the programme

The component securities of the AEX-Index® and CAC 40® indices as well as a number of other securities are included within the scope of the SLP programme. These securities are grouped in baskets of shares (see Annex 1). This programme only concerns the continuous trading session (and excludes the pre-opening, auction and trading-at-last market sessions).

Eligibility criteria:

Any member of the NYSE Euronext European cash markets is eligible for this SLP programme, provided that:

- it is a direct member of NYSE Euronext regulated markets (firms with sponsored access or client DMA firms are not eligible);

[i] Pursuant to Rule 4107 of Euronext Rulebook, Book I, NYSE Euronext determines in its sole discretion the need for liquidity providers on its markets. As a rule, and as provided by Article 1.2.1.1 of the Universal Trading Platform Trading Manual, those usual types of Liquidity Providers as currently defined by said Trading Manual are not accepted on the component securities of the Euronext 100 index, save for exceptions duly announced. However, NYSE Euronext is willing to consider in respect of such securities some applications for liquidity enhancement of a different nature, as described in this Info-Flash. For the avoidance of doubt, such scheme is not applicable to the NYSE Euronext London market.

- it dedicates and identifies specific SLEs for this SLP programme;
- it commits to act within this SLP programme only on its own account by buying and selling financial instruments against its proprietary capital. By definition it thus excludes any form of client flow, even for business conducted as 'riskless principal' in the UK;
- the traders involved in the SLP programme and their direct manager (N+1) should act only on own account. In the case that the traders' N+2 is also responsible for client flow, then the existence of a strong Chinese Wall should be demonstrated to NYSE Euronext and the N+2 should have a sufficient number of persons under his/her responsibility to avoid any risk that flows may be mixed;
- the strategies used for this SLP programme should be considered as liquidity providing by direct members, based on arbitrage criteria. They should also meet good business conduct standards.

Selection process:

The deadline for SLP applications is **Monday 14 February, 2011**. Candidates for the role of SLP must complete the application form in Annex 2 below, indicating the presence time level at the NYSE Euronext best limit for each basket that they are willing to take on.

Once all applications have been considered, a maximum of four SLPs will be selected per basket on the basis of their bids following the criteria below:

- firms that commit to the highest presence time at the NYSE Euronext Best Bid & Offer for the basket concerned (the minimum threshold is defined at 10% of the continuous trading session for each side);
- firms that commit to the highest number of baskets;
- firms that demonstrate adequate internal organisation to conduct such activity.

If the number of applicants for a particular basket is not sufficient at the end of the selection process, NYSE Euronext may decide at will to reallocate those securities into the other basket compositions. The final decision to appoint an SLP rests with NYSE Euronext European Cash Markets.

After the selection process, and before 1 March 2011, NYSE Euronext will inform successful candidates. Roles will be formalised subject to the signing of the formal SLP agreement, setting out the benefits and obligations of the SLP. The selection of an SLP is made for a period of 12 months (March to March), subject to early termination, including if the programme does not meet its goals. After this period, a new selection process will take place, and existing SLPs that have performed well will be recognised for their prior experience in the selection process.

Any and all information exchanged within the ambit of the above selection process between candidates, on the one hand, and NYSE Euronext, on the other hand, shall be kept strictly confidential by each party to the application process, irrespective of the communication means or supporting medium used by the disclosing party.

All bids and applications made by member firms during the selection process are final.

Commitments:

The SLP firm must:

- be present at least 95% of the time on both sides of the market during the continuous trading session;
- deliver the presence time at the NYSE Euronext best limit committed by the applicant during the tender process for each assigned basket of securities;
- send orders of minimum displayed size set at €5,000 at best limit.

Each legal entity may take only one role (either a regular Liquidity Provider[ii] or SLP role) in each security. Only one entity per member firm (or group of member firms) may apply for an SLP role per basket.

The objective of the programme is to enhance the liquidity on a selection of blue-chip stocks. Consequently, NYSE Euronext reserves the right to terminate the programme earlier, in full or in part, in the event that this goal is not achieved.

Should you require any further information, please do not hesitate to contact your local relationship manager at eurmteam@nyx.com or contact Cash Market Surveillance on tel. +33 (0)1 4927 5010.

Kind regards,

NYSE Euronext European Cash Markets

CONTACTS:
Email: membersinfo@nyx.com; equities.eu@nyx.com
For more information and to view past info-flashes, visit: www.euronext.com/cashmembers

[ii] The role of 'Regular Liquidity Provider' corresponds to the Corporate Broker and Dealer profiles as defined on the Euronext website.

ANNEX 1: Basket composition

NAME	ISIN	Basket
ARCELORMITTAL	LU0323134006	1
UNIBAIL-RODAMCO	FR0000124711	1
STMICROELECTRONICS	NL0000226223	1
MICHELIN	FR0000121261	1
SCHNEIDER ELECTRIC	FR0000121972	1
TOTAL	FR0000120271	1
SAINT-GOBAIN	FR0000125007	1
ACCOR	FR0000120404	1
SANOFI- AVENTIS	FR0000120578	1
BNP PARIBAS	FR0000131104	1
DASSAULT SYSTEMES	FR0000130650	1
RHODIA	FR0010479956	1
DELHAIZE GROUP	BE0003562700	1
CGG VERITAS	FR0000120164	1
AIR LIQUIDE	FR0000120073	2
SUEZ ENVIRON.COMP.	FR0010613471	2
PUBLICIS GROUPE	FR0000130577	2
VEOLIA ENVIRON	FR0000124141	2
CREDIT AGRICOLE	FR0000045072	2
TECHNIP	FR0000131708	2
EDF	FR0010242511	2
PERNOD-RICARD	FR0000120693	2
LAFARGE	FR0000120537	2
DANONE	FR0000120644	2
SCOR SE	FR0010411983	2
BUREAU VERITAS	FR0006174348	2
AB INBEV	BE0003793107	2
SAFRAN	FR0000073272	2
ESSILOR INTL	FR0000121667	3
GDF SUEZ	FR0010208488	3
PEUGEOT	FR0000121501	3
SOCIETE GENERALE	FR0000130809	3
LVMH	FR0000121014	3
PPR	FR0000121485	3
EADS	NL0000235190	3
VINCI	FR0000125486	3
ALSTOM	FR0010220475	3
RENAULT	FR0000131906	3
ARKEMA	FR0010313833	3
CASINO GUICHARD	FR0000125585	3
SOLVAY	BE0003470755	3
GEMALTO	NL0000400653	3

NAME	ISIN	Basket
AXA	FR0000120628	4
VIVENDI	FR0000127771	4
NATIXIS	FR0000120685	4
OREAL	FR0000120321	4
BOUYGUES	FR0000120503	4
VALLOUREC	FR0000120354	4
CARREFOUR	FR0000120172	4
CAP GEMINI	FR0000125338	4
FRANCE TELECOM	FR0000133308	4
ALCATEL	FR0000130007	4
VALEO	FR0000130338	4
BELGACOM	BE0003810273	4
LAGARDERE	FR0000130213	4
ROYAL DUTCH SHELLA	GB00B03MLX29	5
AKZO NOBEL	NL0000009132	5
KON PHILIPS ELECTR	NL0000009538	5
TNT	NL0000009066	5
WOLTERS KLUWER	NL0000395903	5
FUGRO	NL0000352565	5
DSM KON	NL0000009827	5
AHOLD KON	NL0006033250	5
UNILEVER	NL0000009355	5
RANDSTAD	NL0000379121	5
AIR FRANCE -KLM	FR0000031122	5
BAM GROEP KON	NL0000337319	5
UMICORE (D)	BE0003884047	5
KONINKLIJKE KPN	NL0000009082	6
ASML HOLDING	NL0006034001	6
ING GROEP	NL0000303600	6
REED ELSEVIER	NL0006144495	6
SBM OFFSHORE	NL0000360618	6
TOM TOM	NL0000387058	6
BOSKALIS WESTMIN	NL0000852580	6
HEINEKEN	NL0000009165	6
CORIO	NL0000288967	6
WERELDHAVE	NL0000289213	6
AEGON	NL0000303709	6
VOPAK	NL0009432491	6
PORTUGAL TELE.NOM.	PTPTC0AM0009	6

ANNEX 2: Application form

NYSE Euronext
Special Liquidity Provider Programme

APPLICATION FORM

Please return the completed application form to NYSE Euronext before **Monday 14 February 2011**, by email to: statisticscash@nyx.com

Details of applicant firm

Company name:	
Trading ID code:	
SLE identifier*:	

*NB if you need to order a new SLE for this purpose, please contact the European Service Desk on: tel: +33 (0) 1 4927 5050; email: esd@nyx.com.

Basket choice and presence time

Basket number: Please indicate choice of basket(s) and proposed presence time	**Presence time at NYSE Euronext best limit:**

Contacts

Contact name for SLP programme:	
Job title/position:	
Telephone number (including extension):	
Email address:	

Signature

Job title:	**Signature of applicant:**	**Date:**
Print full name:		

26 March 2012

PROJECT: **Supplemental Liquidity Provider programme**

Annual renewal of the Supplemental Liquidity Provider programme on European blue chips

Executive Summary

The application process for the annual renewal of NYSE Euronext's Supplemental Liquidity Provider (SLP) programme on European blue chips listed on NYSE Euronext's regulated market opens today for the period 1 June 2012–31 May 2013. The current SLP programme is extended to 31 May 2012. When applying for the new programme, existing participants as well as potential candidates must fulfil eligibility criteria and commit to provide liquidity for specific baskets of blue-chip securities. The completed application form should be returned to NYSE Euronext before Monday 23 April 2012.

NYSE Euronext fine-tuned its European market design in 2011 by introducing Supplemental Liquidity Providers (SLPs) to the market. This liquidity provision programme was implemented on 1 April 2011 for the period of one year, and has enabled NYSE Euronext to reinforce its liquidity offer on European blue-chip firms traded on the regulated markets.[i]

NYSE Euronext received regulatory approval for the renewal of the SLP programme on 23 March 2012, and is therefore pleased to announce the opening of the application process for 2012-13 on all baskets of securities. In order to allow participants ample time to submit their applications, **the current SLP programme is being extended to 31 May 2012** and the renewed SLP programme will run from **1 June 2012 to 31 May 2013.**

A limited number of participants will be selected as special partners to support the new SLP programme, and as for the previous year, a unique and uniform dedicated tariff will apply on their SLP-flagged trading activity.

Scope of the programme

The component securities of the AEX-Index® and CAC 40® indices as well as a number of other securities are included within the scope of the SLP programme. These securities are grouped in baskets of shares (see Annex 1). This programme only concerns the continuous trading session (and excludes the pre-opening, auction and trading-at-last market sessions).

Benefits:

The SLP programme has been designed to enable NYSE Euronext to reward SLPs with a financial rebate when they post liquidity that executes against incoming orders (ie passive trades). A specific harmonized SLP fee schedule based on objective performance will be applied uniformly to the SLP trading activity of all SLP

[i] Pursuant to Rule 4107 of Euronext Rulebook, Book I, NYSE Euronext determines in its sole discretion the need for liquidity providers on its markets. As a rule, and as provided by Article 1.2.1.1 of the Universal Trading Platform Trading Manual, those usual types of Liquidity Providers as currently defined by said Trading Manual are not accepted on the component securities of the Euronext 100 index, save for exceptions duly announced. However, NYSE Euronext is willing to consider in respect of such securities some applications for liquidity enhancement of a different nature, as described in this Info-Flash. For the avoidance of doubt, such scheme is not applicable to the NYSE Euronext London market.

participants selected[ii]. These dedicated benefits have been built in such a way as to incentivize SLPs to deliver the best possible performance with regard to their individual commitments, and to reward liquidity. Each SLP participant that meets the commitments it signed up to will benefit from a specific maker/taker fee schedule on the activity covered by this programme. Depending on the performance delivered and measured objectively using quantitative criteria, SLP participants could benefit from a maximum rebate of 0.20 bps on their maker activity and a minimum charge of 0.30 bps on their taker activity. Details of how these benefits are applied will be set out in the SLP registration form (see Annex 3).

Eligibility criteria:

Any member of the NYSE Euronext European cash markets is eligible for this SLP programme, provided that:

- it is a direct member of NYSE Euronext regulated markets (firms with sponsored access or client DMA firms are not eligible);
- it dedicates and identifies specific SLEs for this SLP programme;
- it commits to act within this SLP programme only on its own account by buying and selling financial instruments against its proprietary capital. By definition it thus excludes any form of client flow, even for business conducted as 'riskless principal' in the UK;
- the traders involved in the SLP programme and their direct manager (N+1) should act only on own account. In the case that the traders' N+2 is also responsible for client flow, then the existence of a strong Chinese Wall should be demonstrated to NYSE Euronext and the N+2 should have a sufficient number of persons under his/her responsibility to avoid any risk that flows may be mixed;
- the strategies used for this SLP programme should be considered as liquidity providing, based on arbitrage criteria. They should also meet good business conduct standards.

Selection process:

The deadline for SLP applications is **Monday 23 April, 2012**. Candidates for the role of SLP must complete the application form in Annex 2 below, indicating the presence time level at the NYSE Euronext best limit for each basket that they are willing to take on.

Once all applications have been considered, a minimum of four SLPs will be selected per basket on the basis of their bids following the criteria below:

- presence time at the NYSE Euronext Best Bid & Offer for the basket concerned (the minimum threshold is defined at 20% of the continuous trading session for each side on average per basket and 10% of the continuous trading session for each side per each individual security included in the basket);
- number of baskets to which a firm is willing to commit;
- demonstration of adequate internal organisation to conduct liquidity providing activity;
- diversity of liquidity providing strategies across the different baskets of securities.

NYSE Euronext is including diversity of liquidity providing strategies as one of the selection criteria for the first time this year. Diversity of the liquidity providing strategies used per basket is a key success factor of the programme as it enhances the price formation process. Consequently NYSE Euronext will also consider objective quantitative criteria (such as, but not limited to, order/trade ratio, maker rate, setting and achieving BBO, market share by volume, presence on listed derivatives) to assess the trading patterns of the SLP.

The final decision to appoint an SLP rests with NYSE Euronext European Cash Markets.

[ii] Please note that activity on securities not included in this programme, all auction activity on securities included in this programme and all other activity not flagged properly on securities included in this programme will be charged at the regular fee rates as in force for trading on NYSE Euronext.

After the selection process, and before 14 May 2012, NYSE Euronext will inform successful candidates. Roles will be formalised subject to the signing of the formal SLP agreement, setting out the benefits and obligations of the SLP. The selection of an SLP is made for a period of 12 months (1 June 2012 to 31 May 2013), subject to early termination, including if the programme does not meet its goals. After this period, a new selection process will take place.

NYSE Euronext reserves the right to select additional participants from the initial applicants at any time during the year of the programme.

Any and all information exchanged within the ambit of the above selection process, between candidates on the one hand and NYSE Euronext on the other hand, shall be kept strictly confidential by each party to the application process, irrespective of the communication means or supporting medium used by the disclosing party.

All bids and applications made by member firms during the selection process are final.

Commitments:

The SLP firm must:

- be present at least 95% of the time on both sides of the market during the continuous trading session;
- deliver the presence time committed by the applicant during the tender process at the NYSE Euronext best limit for each assigned basket of securities with a minimum of 10% per each security included in the basket;
- display a minimum volume of at least €5,000 at best limit.

Each legal entity may take only one role (either a regular Liquidity Provider[iii] or SLP role) in each security. Only one entity per member firm (or group of member firms) may apply for an SLP role per basket.

The objective of the programme is to enhance the liquidity on a selection of blue-chip stocks. Consequently, NYSE Euronext reserves the right to terminate the programme earlier, in full or in part, in the event that this goal is not achieved.

Please see Annex 1 for the list of blue-chip securities in each basket, Annex 2 for the application form, and Annex 3 for a copy of the registration form that successful applicants will be required to sign.

Should you require any further information, please do not hesitate to contact your local relationship manager at eurmteam@nyx.com or contact LPEurope@nyx.com.

Kind regards,

NYSE Euronext European Cash Markets

CONTACTS:
Email: LPEurope@nyx.com; eurmteam@nyx.com
For more information and to view past info-flashes, visit: http://europeanequities.nyx.com/

[iii] The role of 'Regular Liquidity Provider' corresponds to the Corporate Broker and Dealer profiles as defined on the NYSE Euronext website.

ANNEX 1: Basket composition

NAME	ISIN	Basket
ARCELORMITTAL	LU0323134006	1
UNIBAIL-RODAMCO	FR0000124711	1
STMICROELECTRONICS	NL0000226223	1
MICHELIN	FR0000121261	1
SCHNEIDER ELECTRIC	FR0000121972	1
TOTAL	FR0000120271	1
SAINT-GOBAIN	FR0000125007	1
ACCOR	FR0000120404	1
SANOFI- AVENTIS	FR0000120578	1
BNP PARIBAS	FR0000131104	1
DASSAULT SYSTEMES	FR0000130650	1
SODEXHO	FR0000121220	1
DELHAIZE GROUP	BE0003562700	1
CGG VERITAS	FR0000120164	1
SES FDR	LU0088087324	1
AIR LIQUIDE	FR0000120073	2
SUEZ ENVIRON.COMP.	FR0010613471	2
PUBLICIS GROUPE	FR0000130577	2
VEOLIA ENVIRON	FR0000124141	2
CREDIT AGRICOLE	FR0000045072	2
TECHNIP	FR0000131708	2
EDF	FR0010242511	2
PERNOD-RICARD	FR0000120693	2
LAFARGE	FR0000120537	2
DANONE	FR0000120644	2
LEGRAND	FR0010307819	2
NEXANS	FR0000044448	2
AB INBEV	BE0003793107	2
SAFRAN	FR0000073272	2
ZODIAC	FR0000125684	2
ESSILOR INTL	FR0000121667	3
GDF SUEZ	FR0010208488	3
PEUGEOT	FR0000121501	3
SOCIETE GENERALE	FR0000130809	3
LVMH	FR0000121014	3
PPR	FR0000121485	3
EADS	NL0000235190	3
VINCI	FR0000125486	3
ALSTOM	FR0010220475	3
RENAULT	FR0000131906	3
ARKEMA	FR0010313833	3
CASINO GUICHARD	FR0000125585	3
SOLVAY	BE0003470755	3
ATOS ORIGIN	FR0000051732	3
ILLIAD	FR0004035913	3

NAME	ISIN	Basket
AXA	FR0000120628	4
VIVENDI	FR0000127771	4
NATIXIS	FR0000120685	4
OREAL	FR0000120321	4
BOUYGUES	FR0000120503	4
VALLOUREC	FR0000120354	4
CARREFOUR	FR0000120172	4
CAP GEMINI	FR0000125338	4
FRANCE TELECOM	FR0000133308	4
ALCATEL	FR0000130007	4
VALEO	FR0000130338	4
BELGACOM	BE0003810273	4
LAGARDERE	FR0000130213	4
BUREAU VERITAS	FR0006174348	4
EUTELSAT COM.	FR0010221234	4
ROYAL DUTCH SHELLA	GB00B03MLX29	5
AKZO NOBEL	NL0000009132	5
KON PHILIPS ELECTR	NL0000009538	5
POST NL	NL0009739416	5
TNT EXPRESS	NL0009739424	5
WOLTERS KLUWER	NL0000395903	5
FUGRO	NL0000352565	5
DSM KON	NL0000009827	5
AHOLD KON	NL0006033250	5
UNILEVER	NL0000009355	5
RANDSTAD	NL0000379121	5
AIR FRANCE -KLM	FR0000031122	5
KBC	BE0003565737	5
UMICORE (D)	BE0003884047	5
GEMALTO	NL0000400653	5
KONINKLIJKE KPN	NL0000009082	6
ASML HOLDING	NL0006034001	6
ING GROEP	NL0000303600	6
REED ELSEVIER	NL0006144495	6
SBM OFFSHORE	NL0000360618	6
TOM TOM	NL0000387058	6
BOSKALIS WESTMIN	NL0000852580	6
HEINEKEN	NL0000009165	6
CORIO	NL0000288967	6
WERELDHAVE	NL0000289213	6
AEGON	NL0000303709	6
VOPAK	NL0009432491	6
PORTUGAL TELE.NOM.	PTPTC0AM0009	6
APERAM	LU0569974404	6
IMTECH	NL0006055329	6

NYSE Euronext
Special Liquidity Provider Programme

APPLICATION FORM 2012-13

Please return the completed application form to NYSE Euronext before Monday 23 April 2012 by email to: LPEurope@nyx.com

Details of applicant firm

Company name	
Trading ID code	
SLE identifier*:	

**If you need to order a new SLE for this purpose, please contact the European Service Desk on: tel: +33 (0) 1 4927 5050; email: esd@nyx.com.*

Basket choice and presence time

Please indicate choice of basket(s) and proposed presence time:

Basket number:	**Proposed presence time at NYSE Euronext best limit:**

Contacts

Contact name for SLP programme:	
Job title/position:	
Telephone number (including extension):	
Email address:	

Signature

Job title:	**Signature of applicant:**	**Date:**
Print full name:		

ANNEX 3: Registration form to be signed by selected SLPs

SUPPLEMENTAL LIQUIDITY PROVIDER Registration Form 2012-13

NYSE Euronext European Cash Markets

1. The Relevant Euronext Market Undertaking, hereinafter referred to as "NYSE Euronext":

. Euronext Paris SA: ❑[iv]
a public limited liability company (*"societé anonyme"*) incorporated under the laws of France, registered on the Paris Companies Register under the number 343 406 732, having its registered office at 39 rue Cambon, 75039 Paris Cedex 01,

. Euronext Amsterdam N.V.: ❑[iv]
a public limited liability company (*"naamloze vennootschap"*) incorporated under the laws of the Netherlands, registered in the trade register of the Amsterdam Chamber of Commerce under number 34138585, having its registered office at Beursplein 5, 1012 JW Amsterdam,

. Euronext Brussels S.A./N.V.: ❑[iv]
a public limited liability company (*"société anonyme" / "naamloze vennootschap"*) incorporated under the laws of Belgium, registered in the Legal Entities Register under the number TVA BE 0242.100.122, RPM Brussels, CBC Bank 191-0424242-27, having its registered office at Palais de la Bourse, Place de la Bourse, 1000 Brussels,

. Euronext Lisbon S.A.: ❑[iv]
a public limited liability company (*"sociedade gestora de mercados regulamentados"*) incorporated under the laws of Portugal, registered on the Lisbon Companies Register under number 8875, tax identification number 504 825 330, having its registered office at Avenida da Liberdade nº 196 - 7º, 1250 - 147 Lisbon,

. Liffe Administration and Management Unlimited: ❑[iv]
an unlimited liability company incorporated under the laws of England and Wales, registered on the Companies Register under 01591809, having its registered office at Cannon Bridge House, 1 Cousin Lane, London EC4R 3XX

2. The Supplemental Liquidity Provider, hereinafter referred to as "Liquidity Provider" or "SLP":

Member:		Member code 1:		Member code 2:	

- Name of the Liquidity Provider: .....
- Incorporated under the laws of: .....
- Registration number: .....
- Companies register (please specify name): .....
- Registered office city & country: .....

3. Preamble

(A) NYSE Euronext operates regulated cash markets (the "**Platform**") and runs a Supplemental Liquidity Provider Programme (the "**SLP Programme**") for Members that agree to provide liquidity on the Platform according to certain criteria, detailed in Article 2 and Annex 1.

[iv] Please tick the box of the relevant Euronext Market Undertaking

(B) The Member has been selected by NYSE Euronext as an eligible Liquidity Provider.

(C) The SLP has agreed that it will support the Platform by providing liquidity in a selection of securities traded on the Platform to be determined in Annex 1 (the "Securities"). A Benefits Scheme will be provided to reward the SLP.

(D) The objective of the programme is to ensure that NYSE Euronext is at the European best bid and offer for the selected securities at least 70% of the time, as measured independently by the Transaction Auditing Group. Consequently, NYSE Euronext reserves the right to terminate the programme earlier, in full or in part, in the event that this goal is not achieved.

(E) The Parties have agreed to an Initial Liquidity Period between 1 June 2012 and 31 May 2013. The fee scheme as provided for in Article 3 will be reviewed for effectiveness at the end of this initial period. The Agreement could then be renewed to a Standard Liquidity Period every 12 months for another 12 months, depending on the outcome of the review. NYSE Euronext reserves the right to select additional participants from the initial applicants at any time during the year of the programme.

(F) The SLP has verified its regulatory status before entering into this Agreement.

4. Liquidity Provider's commitments

4.1. The SLP will use dedicated SLEs for its SLP activity[v]. All bid and offer price quotes in relation to an individual security (the "**Quote(s)**") entered in the Platform by the SLP pursuant to the Agreement must be flagged with the appropriate technical flagging in order to identify Quotes as part of the SLP programme. Trades resulting from Quotes shall be on the SLP's own account.

4.2 The SLP agrees to provide Quotes on the securities listed in Annex 1 here attached, pursuant to the specific criteria set out in article 4.7. The SLP agrees that NYSE Euronext shall revise the list of securities upon the occurrence of index rebalancing or a corporate event, including but not limited to securities splits, reverse securities splits, mergers and take-overs. NYSE Euronext shall then inform the SLP as soon as possible (by Info-Flash and/or Trading Announcement) and, on a best efforts basis, no later than one (1) business day after the event has occurred. NYSE Euronext reserves the right to add securities to the list of securities, with a maximum limit of 17 securities per basket.

4.3. The SLP will be informed of its compliance with the liquidity criteria set out in article 4.7 on a regular basis (at least weekly).

4.4 For the purposes of ensuring that the SLP has complied with the liquidity criteria, NYSE Euronext reserves the right to exclude trades concluded by the SLP, either acting alone or in concert with other Members, that would not result in a genuine change of ownership in the Security concerned, without prejudice to reporting of potential market abuse to the appropriate competent authorities, including without limitation cross-trades for the same account or prearranged roundtrips.

4.5. The SLP shall act under this Agreement with the reasonable care and reasonable skill of a professional in the financial markets.

4.6. NYSE Euronext will not communicate about the appointment and ongoing presence of an SLP nor any of the SLP's transaction information except on an aggregated, non-attributable basis. Consequently, the SLP agrees to keep this Agreement confidential.

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[v] As a reminder, by applying to the SLP programme, the SLP agreed with the following eligibility criteria: Any member of the NYSE Euronext European cash markets is eligible for this SLP programme, provided that:
- it is a direct member of NYSE Euronext regulated markets (firms with sponsored access or client DMA firms are not eligible);
- it dedicates and identifies specific SLEs for this SLP programme;
- it commits to act within this SLP programme only on its own account by buying and selling financial instruments against its proprietary capital. By definition it thus excludes any form of client flow, even for business conducted as 'riskless principal' in the UK;
- the traders involved in the SLP programme and their direct manager (N+1) should act only on own account. In the case that the traders' N+2 is also responsible for client flow, then the existence of a strong Chinese Wall should be demonstrated to NYSE Euronext and the N+2 should have a sufficient number of persons under his/her responsibility to avoid any risk that flows may be mixed;
- the strategies used for this SLP programme should be considered as liquidity providing by direct members, based on arbitrage criteria. They should also meet good business conduct standards.

4.7. As only blue-chip securities under significant fragmentation are eligible for the SLP programme, the requirements are based on the following criteria.

The SLP firm must:

- Be present at least 95% of the time on both sides of the market during the continuous trading session. This presence in the NYSE Euronext order book is the simple monthly average across all securities included in the same basket of the daily time-weighted presence of open orders flagged SLP per side on an instrument. Whatever the size of the order and the price of the order, as soon as there is an order flagged as SLP, the presence is counted.
- Display a minimum volume of at least €5,000 at the best limit. This minimum display order volume is the simple monthly average across all securities included in the same basket of the daily time weighted average displayed order value (display volume x price) of all open orders at best price flagged SLP per side on an instrument. Whatever the time priority of an order at best limit, as soon as there is an order flagged as SLP, the display order value is included.
- Deliver the presence time committed by the applicant during the tender process at the NYSE Euronext best limit for each assigned basket of securities as defined in Annex 1 with a minimum of 10% of the continuous trading session per each security included in the basket

Each legal entity can only take one role (either a regular Liquidity Provider or SLP role) in each security. Only one legal entity per member firm (or group of member firms) may apply for an SLP role per basket.

5. Liquidity Provider's benefits

5.1. Subject to satisfactory compliance with the terms of the Liquidity Criteria, NYSE Euronext agrees to provide the SLP with the benefits set out below.

5.2. The Member in its capacity of SLP acknowledges its understanding of the global payment terms defined hereunder.

The NYSE Euronext fee policy for the specific purposes of this Agreement is the following (and only concerns the activity flagged as **6:LiquidityProvider**):

The benefits will be based on the quality of the liquidity provision compared to the commitments taken by each SLP.

- above the committed presence at the NYSE Euronext best bid/offer (BBO) and above a monthly average bid/ask presence of 10% per each security included in the basket: taker[vi] activity is charged at +0.3 bps and maker activity is rebated at −0.2 bps for the whole basket
- between the committed presence and the tolerance (10% of the commitment) and above a monthly average bid/ask presence of 10% per each security included in the basket: taker rate is set at 0.55 bps and the maker rate remains at −0.2 bps for the whole basket
- below the tolerance and/or below a monthly average bid/ask presence of 10% on at least one security included in the basket: the taker rate is set at +0.55 bps for the whole basket, the maker rate remained at −0.2 bps for the securities above the commitment (if any) and the maker rate is set at +0.55 bps for the other securities of the basket.

In the case that NYSE Euronext decides to amend the applicable fee policy, a 30-day notice period will apply.

After two (2) consecutive months of performance below the commitment (including in the tolerance zone), the contract will be terminated for the basket.

Furthermore,

a) Securities NOT included in this Agreement shall be charged at the regular fee rates as in force for trading on NYSE Euronext and published from time to time by NYSE Euronext.
b) Any application or variation of the fee policy shall not have retrospective effect.
c) There is no order/trade ratio for the activity flagged as SLP on the securities under the programme.

[vi] The platform designates an aggressive order and a passive order for each trade. Typically, the aggressive order is the order that triggers the trade – normally the incoming order – and the passive order is the queued order already in the order book

d) SLPs are offered to have maximum 3 dedicated SLEs at maximum 500 msg/sec per basket at a special rate of 50% (ie €3,000 for each SLE based on current tariff).

6. Date of effect

This Agreement shall come into force on 1 June 2012 or, when that date has passed, within 5 trading days from the signature by the relevant NYSE Euronext representative, and cancels and replaces any previous Liquidity Provider agreement for the instruments concerned.

7. Term and termination

The objective of the programme is to enhance the liquidity on a selection of blue-chip securities. Consequently, NYSE Euronext reserves the right to terminate the programme earlier, in full or in part, in the event that this goal is not achieved.

8. Contacts

For NYSE Euronext:	Laurent Fournier Business Analysis and Statistics Tel: + 33 (0)1 49 27 19 60 Email: LPEurope@nyx.com
For the Liquidity Provider: Full name: Telephone number: Email:	 ... ...

9. Terms and Conditions

The Terms and Conditions for Liquidity Providers and NYSE Euronext Cash Markets are part of this Agreement and may be amended from time to time. In case of conflicting clauses between this document and with the Terms and Conditions and/or by exception the Rules, the clauses from the Registration Form prevail.

By signing the Registration Form, the Liquidity Provider shall accept the version of the Terms and Conditions applicable at the time of the date of signature mentioned below. The current Terms and Conditions are made available at any time upon request of the Liquidity Provider, and at the date of signature the Liquidity Provider acknowledges that it agrees to them.

Agreed and signed in two original copies. Date:

NYSE Euronext		**Liquidity Provider**	
Name:	...	Name:	...
Title: .	..	Title: .	..

INFO-FLASH

EURONEXT CASH MARKETS

NYSE EURONEXT

DATE: **9 MAY 2013**

PROJECT: **SUPPLEMENTAL LIQUIDITY PROVIDER PROGRAMME**

TENDERING FOR APPLICATIONS FOR A NEW SUPPLEMENTAL LIQUIDITY PROVIDER PROGRAMME ON EUROPEAN BLUE CHIPS

Executive Summary

The application process for the next iteration of NYSE Euronext's Supplemental Liquidity Provider (SLP) programme on European blue chips listed on NYSE Euronext's regulated market opens today. When applying for the new programme, existing SLP participants as well as potential candidates must fulfil eligibility criteria and commit to provide liquidity for specific baskets of blue-chip securities. Completed application forms should be returned to NYSE Euronext before 17 May 2013 in order to be included in the programme as from 3 June 2013. Applications received after 17 May 2013 will be considered for the start of the next relevant calendar month.

NYSE Euronext is launching a new, revised, Supplemental Liquidity Provider (SLP) programme on European blue-chip companies traded on its regulated markets.[1] First introduced in April 2011, the programme has enabled NYSE Euronext to reinforce its liquidity offer on European blue-chip companies. The SLP programme has now been modified to include a new fee schedule, no bidding process and revised commitments that include a minimum passive execution level.

Regulatory approval for the renewal and amendment of the existing Supplemental Liquidity Provider (SLP) programme was received on 2 May 2013, and NYSE Euronext is pleased to announce the opening of the application process for the new revised SLP programme as of today, 9 May 2013.

Participants will be selected to support the new SLP programme with a dedicated tariff applicable to their SLP-flagged trading activity. Completed application forms should be returned to NYSE Euronext before close

[1] Pursuant to Rule 4107 of Euronext Rulebook, Book I, NYSE Euronext determines in its sole discretion the need for liquidity providers on its markets. As provided by Article 1.2.1.1 of the Universal Trading Platform Trading Manual, those usual types of Liquidity Providers as currently defined by said Trading Manual are not accepted on the component securities of the Euronext 100 index, save for exceptions duly announced. By implementing the proposed SLP Programme, NYSE Euronext will consider applications for liquidity enhancement of a different nature in respect of predefined blue-chip securities, as described in this Info-Flash.

of business on **17 May 2013** in order to be included in the programme as from 3 June 2013. Applications received after 17 May 2013 will be considered for the start of the next relevant calendar month.

SCOPE OF THE PROGRAMME

The component securities of the AEX-Index® and CAC 40® indices as well as a number of other securities are included within the scope of the SLP programme. These securities are now grouped into baskets of shares (see Annex 1). The SLP programme applies only to the continuous trading session (and excludes the pre-opening, auction and trading-at-last market sessions).

APPLICATION PROCESS

Candidates for the role of SLP as of the start of the new programme must return to NYSE Euronext:

- By close of business on Friday 17 May 2013, a signed and completed **application form**, indicating the baskets for which they would like to act as SLP;
- By close of business on Friday 31 May 2013, a signed and completed **registration form**, setting out the terms and conditions applicable to an SLP.

Please note that if the registration form is not received by this date, the SLP will not be able to start its activity until the following month.

Application and registration forms are available from your relationship manager or from LPEurope@nyx.com

In addition, appropriate conformance testing must be carried out (SLPs that have participated in the previous June 2012-May 2013 SLP programme will not normally be requested to pass a conformance test).

Future applications

Future candidates for the role of SLP must return to NYSE Euronext:

- a signed and completed **application form**, indicating the baskets for which they would like to act as SLP;
- a signed and completed **registration form**, setting out the terms and conditions applicable to an SLP.

Future applications, including the application form and the registration form, must be received by NYSE Euronext by close of business on the 15th of any given calendar month[2] (hereinafter referred to as month "M"), in order to become active on the first business day of the following month M+1, providing that appropriate conformance testing has been carried out and they have been accepted in the programme based on the criteria set out below.

SLPs that have participated in the previous June 2012-May 2013 SLP programme will not normally be requested to pass a conformance test.

Any application received after the 15th of any given calendar month[2] will be processed for a start of SLP activity as from the first business day of the second successive month (i.e. M+2).

[2] Or previous business day if the 15th is not a business day.

Changes to applications

Any request to change the scope of an application previously filed (whether by adding or removing a basket of securities) should be received by close of business on the 20th of any given calendar month[3] in order to be effective as from the first business day of the following month (i.e. M+1).

Any request for changes to the scope of an application previously filed that is received after the 20th of any given calendar month will be processed on a reasonable efforts basis, so as to be made effective as soon as possible after the first business day of the following month M+1.

The final decision as to whether or not to appoint (including the decision not to renew) an SLP for any given month of the programme rests with NYSE Euronext and will be taken on an objective and non-discriminatory basis in accordance to the eligibility criteria mentioned below, subject to reasonable advance notice being given to the relevant applicant and/or SLP participant, as relevant. To this effect, and as far as reasonably possible, NYSE Euronext will inform applicants within five business days of receipt of their duly completed application.

BENEFITS

The SLP programme has been designed to enable NYSE Euronext to reward SLPs with a financial rebate when they post liquidity that executes against incoming orders (i.e. passive trades), and a specific rate applied to their aggressive trades. These dedicated benefits have been built in such a way as to incentivise SLPs to deliver the best possible performance with regard to the obligations set out in the SLP contract, and to reward liquidity.

A specific harmonised SLP fee schedule based on objective criteria will be applied uniformly to the SLP trading activity of all SLP participants selected[4].

Each SLP participant that meets the commitments detailed below will benefit from a specific maker/taker fee schedule on the activity covered by this programme. Depending on the performance delivered and measured objectively using quantitative criteria, SLP participants can benefit from a maximum rebate of 0.22 bps on their maker activity and a minimum charge of 0.30 bps on their taker activity during continuous trading[5]. Details of how these benefits are applied are set out in the SLP registration form.

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[3] Or previous business day if the 20th is not a business day.

[4] Please note that activity on securities not included in this programme, all auction activity on securities included in this programme, and all other activity not flagged properly on securities included in this programme will be charged at the regular fee rates as in force for trading on NYSE Euronext.

[5] For the purpose of defining the benefits for which an SLP is eligible, the BBO presence time and the monthly traded passive turnover are taken into account:

1. above a monthly average 22.5% (i.e. 25% minus a 10% tolerance level) presence at the NYSE Euronext best bid/offer (BBO) in the basket and above a monthly average minimum passive executed volume of 0.7%:
   - for those securities where both a minimum BBO presence time of 10% and minimum passive executed volume of 0.1% are reached: taker activity is charged at +0.3 bps and maker activity is rebated at −0.22 bps;
   - for those securities where only the minimum passive executed volume of 0.1% is reached: taker activity is charged at 0.55 bps and the maker rate remains at −0.22 bps;
   - for those securities where the minimum passive executed volume is not reached: taker activity and maker activity are charged at 0.55bps.
2. if the two criteria are not met, that is, a monthly average 22.5% (i.e. 25% minus a 10% tolerance level) presence at the NYSE Euronext best bid/offer (BBO) in the basket and/or the monthly average minimum passive executed volume of 0.7% is not reached: taker activity and maker activity are charged at 0.55bps.

In addition, SLPs ordering dedicated SLEs (CCG sessions) for the purpose of carrying out SLP activity under the SLP programme will be offered a special purchase rate of 50% against the applicable purchase fees, provided that they are dedicated to SLP activity exclusively. The maximum throughput size for an SLE used for SLP activity is 700 msg/second, leading to a maximum possible discount of €4,000 for each 700msg/second SLE, based on the current tariff.

ELIGIBILITY CRITERIA

Any member of the Euronext securities markets is eligible for this SLP programme, provided that:

- it is a member of the Euronext securities markets;
- it is authorised as an investment firm pursuant to MiFID[6];
- it dedicates and identifies specific SLEs for this SLP programme;
- it commits to act within this SLP programme only on its own account by buying and selling financial instruments against its proprietary capital. By definition it thus excludes any form of client flow, even for business conducted as 'riskless principal' in the UK;
- the strategies used for this SLP programme should be considered as liquidity provision, based on arbitrage criteria.

COMMITMENTS

In relation to those securities (and/or basket of securities) for which the SLP has been appointed as such, it must:

- **be present at least 95% of the time on both sides of the market during the continuous trading session.** This presence in the NYSE Euronext order book is the simple monthly average across all securities included in the same basket of the daily time-weighted presence of open orders flagged as SLP, per side, on an instrument. Presence is counted as soon as there is an order flagged as SLP, whatever the size and price of the order;
- **display a minimum volume of at least €5,000 at the best limit.** This minimum display order volume is the simple monthly average across all securities included in the same basket of the daily time-weighted average displayed order value (display volume x price) of all open orders at best price flagged as SLP, per side, on an instrument. The display order value is included as soon as there is an order flagged as SLP, whatever the time priority of an order at best limit; and
- **deliver a minimum passive execution level of 0.70% of the value of the passive executed volume** expressed in percentages of the aggregate monthly volume traded on Chi-X, BATs, Turquoise and NYSE Euronext**, and a minimum presence time of 25% at the NYSE Euronext best limit for each assigned basket of securities** as defined in Annex 1, weight-averaged over the entire basket and over the calendar month, with a minimum passive execution level of 0.1% and a minimum presence time of 10% at the NYSE Euronext best limit of the continuous trading session for each security included in the relevant basket. This minimum is also weight-averaged over the calendar month.

[6] Those firms which are not currently authorised as investment firms are required to submit in good faith an application for authorisation to the relevant competent authority within three months of applying for inclusion in the SLP programme.

The objective of the SLP programme is to enhance liquidity on a selection of blue-chip stocks. Consequently, NYSE Euronext reserves the right to terminate the programme at any time, in full or in part, in the event that this goal is not achieved.

Please see Annex 1 for the list of blue-chip securities in each basket[7].

PROGRAMME DURATION

The new SLP programme has no end date. NYSE Euronext may terminate the SLP programme at any time, subject to providing two months advance notice to SLP participants, it being understood that effective termination of the SLP programme shall coincide with the last business day of a calendar month.

Without prejudice to the above, NYSE Euronext has full discretion in deciding whether to terminate the SLP programme, so that the latter may be terminated accordingly irrespective of whether its goals are met or not.

Should you require any further information, or to receive copies of the registration and application forms, please contact your relationship manager at eurmteam@nyx.com or contact LPEurope@nyx.com.

[7] In the case where an SLP were to choose to take up a role in both basket A and basket C, those securities that are present in both baskets will be tied to basket C and the volume will only be counted once for the purpose of the benefit calculation.

ANNEX 1: BASKET COMPOSITION

NAME	ISIN	BASKET
ARCELORMITTAL	LU0323134006	A & C
UNIBAIL-RODAMCO	FR0000124711	A & C
STMICROELECTRONICS	NL0000226223	C
MICHELIN	FR0000121261	C
SCHNEIDER ELECTRIC	FR0000121972	C
TOTAL	FR0000120271	C
SAINT-GOBAIN	FR0000125007	C
ACCOR	FR0000120404	C
SANOFI- AVENTIS	FR0000120578	C
BNP PARIBAS	FR0000131104	C
DASSAULT SYSTEMES	FR0000130650	C
SODEXHO	FR0000121220	C
DELHAIZE GROUP	BE0003562700	C
CGG VERITAS	FR0000120164	C
SES FDR	LU0088087324	C
AIR LIQUIDE	FR0000120073	C
SUEZ ENVIRON.COMP.	FR0010613471	C
PUBLICIS GROUPE	FR0000130577	C
VEOLIA ENVIRON	FR0000124141	C
CREDIT AGRICOLE	FR0000045072	C
TECHNIP	FR0000131708	C
EDF	FR0010242511	C
PERNOD-RICARD	FR0000120693	C
LAFARGE	FR0000120537	C
DANONE	FR0000120644	C
LEGRAND	FR0010307819	C
NEXANS	FR0000044448	C
AB INBEV	BE0003793107	C
SAFRAN	FR0000073272	C
ZODIAC	FR0000125684	C
ESSILOR INTL	FR0000121667	C
GDF SUEZ	FR0010208488	C
PEUGEOT	FR0000121501	C
SOCIETE GENERALE	FR0000130809	C
LVMH	FR0000121014	C
PPR	FR0000121485	C
EADS	NL0000235190	C
VINCI	FR0000125486	C
ALSTOM	FR0010220475	C
RENAULT	FR0000131906	C
ARKEMA	FR0010313833	C
CASINO GUICHARD	FR0000125585	C
SOLVAY	BE0003470755	C
ATOS ORIGIN	FR0000051732	C
ILLIAD	FR0004035913	C

Minimum presence time at BBO: 25%

NAME	ISIN	BASKET
AXA	FR0000120628	C
VIVENDI	FR0000127771	C
NATIXIS	FR0000120685	C
OREAL	FR0000120321	C
BOUYGUES	FR0000120503	C
VALLOUREC	FR0000120354	C
CARREFOUR	FR0000120172	C
CAP GEMINI	FR0000125338	C
FRANCE TELECOM	FR0000133308	C
ALCATEL	FR0000130007	C
VALEO	FR0000130338	C
BELGACOM	BE0003810273	C
LAGARDERE.	FR0000130213	C
BUREAU VERITAS	FR0006174348	C
EUTELSAT COM	FR0010221234	C
ROYAL DUTCH SHELLA	GB00B03MLX29	A
AKZO NOBEL	NL0000009132	A
KON PHILIPS ELECTR	NL0000009538	A
POST NL	NL0009739416	A
TNT EXPRESS	NL0009739424	A
WOLTERS KLUWER	NL0000395903	A
FUGRO	NL0000352565	A
DSM KON	NL0000009827	A
AHOLD KON	NL0006033250	A
UNILEVER	NL0000009355	A
RANDSTAD	NL0000379121	A
AIR FRANCE -KLM	FR0000031122	A
KBC	BE0003565737	A
UMICORE (D)	BE0003884047	A
GEMALTO	NL0000400653	A
KONINKLIJKE KPN	NL0000009082	A
ASML HOLDING	NL0006034001	A
ING GROEP	NL0000303600	A
REED ELSEVIER	NL0006144495	A
SBM OFFSHORE	NL0000360618	A
TOM TOM	NL0000387058	A
BOSKALIS WESTMIN	NL0000852580	A
HEINEKEN	NL0000009165	A
CORIO	NL0000288967	A
WERELDHAVE	NL0000289213	A
AEGON	NL0000303709	A
VOPAK	NL0009432491	A
PORTUGAL TELE.NOM.	PTPTC0AM0009	A
APERAM	LU0569974404	A
IMTECH	NL0006055329	A

Minimum presence time at BBO: 25%

INFO-FLASH

EURONEXT CASH MARKETS

DATE: **1 OCTOBER 2013**

MARKET: **EURONEXT CASH MARKETS**

PROJECT: **SUPPLEMENTAL LIQUIDITY PROVIDER PROGRAMME**

SUPPLEMENTAL LIQUIDITY PROVIDER PROGRAMME FEE SCHEDULE ADJUSTMENT

Executive Summary

The Supplemental Liquidity Provider (SLP) programme fee schedule will be adjusted from 1 November 2013. The maximum rebate for maker activity will be reduced by 0.02bps to 0.20 bps.

NYSE Euronext informs clients that the fee schedule for participants in the current Supplemental Liquidity Provider (SLP) programme will be adjusted from 1 November 2013. The SLP fee schedule is applied uniformly to the SLP trading activity of all SLP participants.

As of 1 November 2013, those SLP participants that meet the commitments detailed in their registration form, the details of which were outlined in the Info-Flash of 9 May 2013: 'Tendering for Applications for a new Supplemental Liquidity Provider Programme on European Blue Chips', will benefit from a maximum rebate of 0.20 bps on their maker activity (previously 0.22bps) and an unchanged minimum charge of 0.30 bps on their taker activity during continuous trading.

Should you require any further information, please contact your relationship manager at eurmteam@nyx.com or contact LPEurope@nyx.com.

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