上海原油期货和期权市场发展报告

2022 Development Report of Shanghai Crude Oil Futures and Options Market

上海期貨交易所
SHANGHAI FUTURES EXCHANGE
上海国际能源交易中心
SHANGHAI INTERNATIONAL ENERGY EXCHANGE

01 Milestones

上海原油期货大事记

02 2022 Development Report of Shanghai Crude Oil Futures and Options Market

2022年上海原油期货和期权市场发展报告

03 Crude Oil Futures Awards

原油期货获奖名单

01

Milestones

上海原油期货大事记

2018

2018.03.15 上期能源完成香港自动化交易服务（ATS）注册。

2018.03.26 原油期货作为中国首个国际化商品期货上市。

2018.06.20 国内首船期货原油卸至大连中石油国际储运有限公司指定交割库。

2018.11.15 获得新加坡金融管理局（MAS）批准，成为认可的市场经营者（RMO）。

2019

2019.03.26 发布原油价格指数。

2019.10.30 增加中石化海南原油期货交割存放点，核定库容 100 万立方米，启用 40 万立方米。

2020

2020.04.16 增加大连北方油品储运有限公司作为原油期货指定交割仓库，增加大连中石油国际储运有限公司国际储备库作为原油期货指定交割仓库存放点。

2020.04.17 增加中化弘润石油储运（潍坊）有限公司作为原油期货指定交割仓库。

2020.04.20 达上市以来最高持仓量 18.84 万手。

2020.04.24 增加中国石化集团石油商业储备有限公司广东省湛江市临港工业园兴港大道湛江商储分公司、河北省唐山市曹妃甸工业区曹妃甸商储分公司作为原油期货指定交割仓库存放点。

2020.05.19 达上市以来最高成交量 49.48 万手。

2020.06.03 上期所和上期能源被纳入欧洲证券及市场管理局（ESMA）的第三国交易场所交易后透明度评估正面清单。

2020.08.01 达上市以来单月最大交割量 1385.9 万桶。

2020.09.07 增加大连中石油国际储运有限公司广西中石油国际储备库作为原油期货指定交割仓库存放点。

2020.10.12 推出原油期货结算价交易指令（TAS），发布日中交易参考价（Marker Price）。

2020.12.01 穆尔班原油被列入上海原油期货的可交割油种之中。自 2021 年 6 月 1 日起，穆尔班原油可入库生成标准仓单，并用于期货交割。

2021

2021.02.03 增加大鼎油储有限公司位于浙江省舟山市定海区临城街道岙山东路油库成为原油期货存放点。

2021.02.09 同意青岛海业摩科瑞仓储有限公司位于山东省青岛市黄岛区董家口港区港润大道油库成为原油期货存放点。

2021.06.21 原油期权在上期能源正式挂牌交易。

2021.12.31 境外参与者涵盖 6 大洲（亚洲、非洲、欧洲、北美洲、大洋洲、南美洲）20 多个国家和地区。

待续……

2018

2018.03.15 INE completed the registration for Hong Kong Automated Trading Services (ATS).

2018.03.26 Shanghai crude oil futures—China' s first international commodity futures—was listed for trading.

2018.06.20 The first shipment of crude oil for futures delivery was unloaded into the designated delivery storage facility of Dalian PetroChina International Warehousing & Transportation Co., Ltd.

2018.11.15 INE was approved by the Monetary Authority of Singapore (MAS) as a Recognized Market Operator (RMO).

2019

2019.03.26 INE launched the crude oil price index.

2019.10.30 Sinopec Hainan was approved as a delivery and storage location for crude oil futures, with an approved storage capacity of 1,000,000 m^3 and an initially available capacity of 400,000 m^3.

2020

2020.04.16 INE approved Dalian North Oil Petroleum Logistics as a designated delivery storage facility for crude oil futures and the International Reserve Depot of Dalian PetroChina International Warehousing & Transportation as a designated delivery and storage location.

2020.04.17 Sinochem-Hongrun Oil Staging (Weifang) Co., Ltd. was approved as a designated delivery storage facility for crude oil futures.

2020.04.20 Shanghai crude oil futures recorded the highest open interest of 188,400 lots since launch.

2020.04.24 Sinopec Petroleum Reserve Co., Ltd. (SPRC) Zhanjiang Branch (located at Xinggang Avenue, Lingang Industrial Zone, Zhanjiang, Guangdong) and SPRC Caofeidian (located at Caofeidian Industrial Zone, Tangshan, Hebei) were approved as designated delivery and storage locations for crude oil futures.

2020.05.19 Shanghai crude oil futures reached a new open interest record of 494,800 lots.

2020.06.03 SHFE and INE were added to ESMA' s positive list for post-trade transparency as third-country trading venues.

2020.08.01 Shanghai crude oil futures recorded its highest single-month delivery volume of 13,859,000 barrels since launch.

2020.09.07 Guangxi PetroChina International Reserve Depot of Dalian PetroChina International Warehousing & Transportation was approved as a designated delivery and storage location for crude oil futures.

2020.10.12 INE introduced TAS orders and began to release the intraday marker price.

2020.12.01 Murban Crude was added as a deliverable product for Shanghai crude oil futures. From June 1, 2021, Murban Crude may be loaded in to create standard warrants and for delivery.

2021

2021.02.03 The depot of Dading Petroleum Logistics Co., Ltd. (located at Aoshan East Road, Lincheng Sub-District, Dinghai District, Zhoushan, Zhejiang) was approved as a physicals storage location for crude oil futures.

2021.02.09 The depot of Qingdao Haiye Mercuria Oil Terminal Co., Ltd. (located at Gangrun Avenue, Dongjiakou Port, Huangdao District, Qingdao, Shandong) was approved as a physicals storage location for crude oil futures.

2021.06.21 Crude oil options were listed on INE.

2021.12.31 Overseas participants on INE markets represented over 20 countries and regions in 6 continents (Asia, Africa, Europe, North America, Oceania, and South America).

To be continued……

获奖情况

2021 年 9 月 9 日，《期货期权世界》（FOW）举办了“2021 年度亚洲资本市场颁奖典礼”。上海期货交易所（下称上期所）及其子公司上海国际能源交易中心（下称上期能源）荣获“最佳衍生品交易所”、“最佳大宗商品交易所”、“最佳新衍生品合约”和“最佳中国交易所”4 项大奖。上期所总经理王凤海荣膺“最佳首席执行官”奖项。

Honors

On September 9, 2021, the FOW Asia Capital Markets Awards 2021 was held online. Shanghai Futures Exchange (SHFE) and its subsidiary Shanghai International Energy Exchange (INE) were awarded “Exchange of the Year – Derivatives,” “Exchange of the Year – Commodities,” “Best New Derivative Contract,” and “Chinese Exchange of the Year.” Wang Fenghai, CEO of SHFE, was named “Chief Executive of the Year.”

02

2022 Development Report of Shanghai Crude Oil Futures and Options Market

2022年上海原油期货和期权市场发展报告

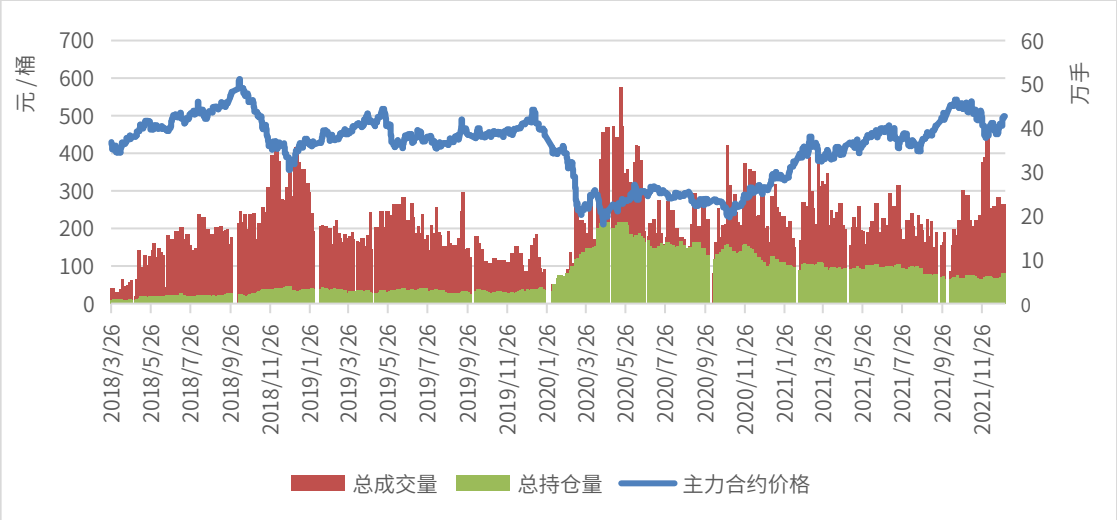
2022 年上海原油期货和期权市场发展报告

2021 年，全球经济在新冠疫情笼罩下逐步复苏，原油需求强劲反弹带动油价大幅上涨。上海原油期货（品种代码：SC）价格与境外油价高度联动，并有效反映区域市场供需特点。成交规模稳步提升，机构客户参与度和境外客户参与度大幅提高，与境外市场联动发展更加紧密。此外，上海国际能源交易中心于 2021 年 6 月 21 日上市了原油期权，实现了中国能源衍生品多层次市场联动发展。

一、价格与境外市场高度联动，并有效反映区域市场供需特点

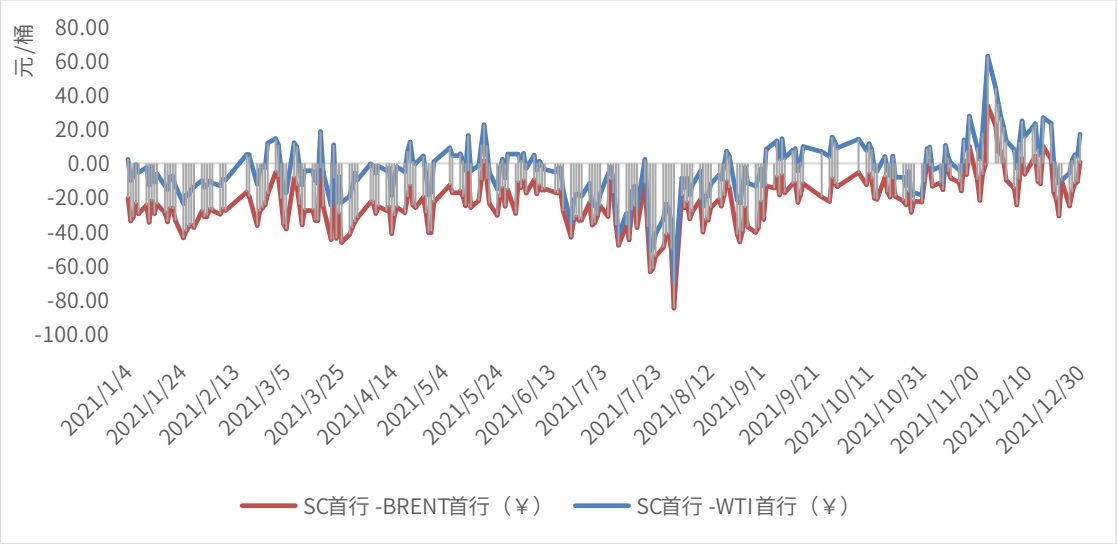
2021 年，伴随全球新冠疫苗接种的普及，各国对出行陆续解封带动原油需求恢复性增长。但供应恢复缓慢使得全球原油供需偏紧，推动全球原油市场由 2020 年的累库转为大幅去库存周期。截至 2021 年底，全球原油库存水平已处于 5 年同期低位。上海原油期货价格高度反映市场基本面变化，价格震荡上行，库存逐步下降。主力合约期初开盘 302.9 元 / 桶，年末收于 499.0 元 / 桶，涨幅 64.74%。期间，最高价 546.5 元 / 桶，最低价 301.6 元 / 桶（图 1）。首行合约与 Brent 原油期货首行合约价差最高 33.7 元 / 桶，最低 -84.9 元 / 桶，全年平均 -22.2 元 / 桶（图 2）。

图1 上海原油期货运行概况



数据来源：上海国际能源交易中心

图2 上海原油期货与境外原油期货价差



数据来源：上海国际能源交易中心、路透

上海原油期货价格在与境外原油期货市场保持高度联动的同时，价格波动呈现一定独立性，中国因素在价格中的体现不断增强。2021 年，SC 与 Brent、WTI 原油期货的相关系数分别为 0.977 和 0.969，高于 2020 年的 0.961 和 0.894。同时，根据对 SC、Brent 以及 WTI 三个期货市场价格的协整检验结果，三者之间存在 2 个长期均衡关系，表明上海原油期货已基本融入国际原油期货市场，并形成相互联动的关系。在此基础上，与境外原油期货市场相比，上海原油期货更加反映亚太区域市场特点。根据格兰杰因果检验结果，Brent 分别与 SC、WTI 互为因果关系，而代表亚太市场的 SC 和代表北美原油市场的 WTI 之间的因果关系不显著，表明 Brent 分别与 SC 和 WTI 相互影响，但 SC 和 WTI 市场相对独立。

山东地区是我国主要的独立炼厂聚集地，其炼厂开工率很大程度可反映出中国原油供需的边际变化情况。自 2020 年新冠疫情爆发以来，山东独立炼厂开工率于 2020 年 2 月初开始下降，并于 2 月中旬降至低点 36% 左右。随着中国疫情得到控制，开工率逐步反弹，于 3 月底恢复至 60% 以上，于 4 月底升至 70% 并维持在 75% 左右。同期，上海原油期货价格也出现了跌幅小于境外、上涨先于境外的情况，有效反映了中国需求变化情况。以山东独立炼厂周度开工率数据为依据，格兰杰因果检验显示，在 5% 的显著性水平下，上海原油期货价格与山东独立炼厂开工率互为格兰杰因果，即统计学上两者相互影响。脉冲响应结果显示，原油价格对炼厂开工率的脉冲响应基本是正向的，但影响滞后期较长，在 6-7 期达到峰值，反映出山东独立炼厂开工率可以在一定程度上用来分析上海原油价格，但目前即时性有限。

二、健全国际原油市场价格发现机制，促进国际原油期货市场良性互动

随着市场关注度和参与度的提升，上海原油期货市场规模和交易者结构得到了良好发展。2021 年，上海原油期货交易量、持仓量维持上市以来高位水平，市场规模仅次于 WTI 和 Brent 原油期货，在期货业协会（FIA）公布的全球能源类商品期货期权交易量排名上升至第 13 位。境外客户覆盖了六大洲 20 多个国家和地区，境外特殊参与者共 3 家，备案的境外中介机构达 75 家。

从交易情况看，全年累计成交 4264.5 万手（单边，下同），累计成交金额 18.5 万亿，同比分别增长 2.6% 和 54.6%。日均成交 17.5 万手，日均持仓 7.5 万手。市场参与者结构方面，一般法人和特殊法人等机构交易者日均成交占比超过 5 成，持仓占比约 7 成，日均成交和持仓占比较 2020 年分别增长 8.1、7.6 个百分点；境外参与者成交和持仓占比较 2020 年分别增长6.9和6.5个百分点。机构交易者的交易、持仓和套期保值比例位居境内已上市期货品种前列，涵盖了石油公司、跨国贸易公司、投资银行、基金和资产管理公司中的标杆性企业。

表1 上海原油期货上市以来交易交割情况

年份	日均交易（万手）	日均持仓量（万手）	总交割量（万桶）
2021	17.5	7.5	2163.6
2020	17.1	11.9	8515.9
2019	14.2	2.9	1761.8
2018	14	2	284.9

上海原油期货的上市填补了中国乃至亚太原油市场的空白，健全了国际原油市场价格联动机制，已日益成为国际原油市场不可或缺的有机组成部分。在跨市场联动下，上海原油期货不仅实现了自身快速发展，提升了中国数据对国际市场的影响，还在一定程度上促进了境外原油期货市场的活跃度。根据格兰杰因果检验结果显示，2018-2021 年，SC 为 Brent、WTI 格兰杰原因的显著性明显增加，表明上海原油期货对 Brent 和 WTI 原油期货市场的影响增强（表 2）。从日盘成交占比看，在北京时间 9:00-11:30 和 13:30-15:00 的亚洲交易时段，Brent 和 WTI 原油期货的成交量占各自全天成交的比例，已从上海原油期货上市前的 2.87%、2.91%，分别增长至 4.71%、5.30%，统计学上显著上升 64.12%、82.13%（表 3）。从开盘时段成交对比情况看，Brent 和 WTI 原油期货在上海原油期货上、下午开盘前后各 30 分钟的交易量占比从上海原油期货上市前的 0.81%、1.19%，增长至 1.68%、2.42%，统计学上显著上升 107.41%、103.37%（表 4）。

表2 2018-2021年格兰杰因果检验结果

	2018年	2019年	2020年	2021年
WTI→SC	3.818	14.129***	1.131	4.013
Brent →SC	20.926***	10.491***	42.961***	8.359***
SC→WTI	0.490	0.318	4.102	5.569
Brent →WTI	2.732	0.751	140.870***	0.657
SC→Brent	0.486	0.457	12.611***	8.329***
WTI→Brent	7.126**	1.583	34.384***	0.927

数据来源：上海国际能源交易中心、路透

表3 欧美原油期货市场亚洲时段成交占比

日盘成交占比	Brent	WTI
2015.3.26-2018.3.25（上市前3年）	2.87%	2.91%
2018.3.26-2021.12.31（上市后截至2021年底）	4.71%	5.30%
2019年	4.17%	4.52%
2020年	4.85%	5.44%
2021年	5.61%	6.13%

数据来源：上海国际能源交易中心、路透

表4 欧美原油期货市场在亚洲开盘时段成交占比

开盘前后成交占比 （北京时间8:30-9:30和13:00-14:00）	Brent	WTI
2015.3.26-2018.3.25（上市前3年）	0.81%	1.19%
2018.3.26-2021.12.31（上市后截至2021年底）	1.68%	2.42%
2019年	1.46%	2.03%
2020年	1.83%	2.62%
2021年	2.04%	2.76%

数据来源：路透

三、依托境内、境外两大市场，拓展交割仓库布局，引导资源优化配置

2021 年，上海国际能源交易中心立足市场发展需要，持续扩大原油期货交割仓库库容，拓展交割仓库辐射范围，优化交割仓库布局。新增首个跨国企业背景仓储企业青岛海业摩科瑞仓储有限公司以及境内民营企业大鼎油储有限公司作为指定交割仓库，新增库容共计 369.2 万桶，交割仓库主体更加多元化。截至 2021 年底，原油期货共有 16 个存放点，核定库容 6925 万桶（表 5）。

表5 2021年上海原油期货交割仓库和交割量

序号	指定交割仓库	存放点	启用库容（万桶）	2021年交割量（万桶，不含期转现）
1	中国石化集团石油商业储备有限公司	中国石化曹妃甸	200	53.3
2		中国石化日照	520	211.7
3		中国石化册子岛	350	41.5
4		中国石化湛江	416	281.6
5		中国石化海南	300	0
6	中石油燃料油有限责任公司	中油湛江	311	0
7	中化兴中石油转运（舟山）有限公司	中化兴中	210.1	0
8	大连中石油国际储运有限公司	中油大连保税库	829.5	242.2
9		中油大连国际储备库	1080	220.7
10		中油广西国际储备库	120	117.4
11	山东省港口集团有限公司	青岛港实华	239.2	0
12		青岛港摩科瑞	239.2	0
13	洋山申港国际石油储运有限公司	洋山石油	126	163
14	大连北方油品储运有限公司	北方油品	54	21.2
15	中化弘润石油储运（潍坊）有限公司	中化弘润潍坊	1800	811
16	大鼎油储有限公司	大鼎油储	130	0
合计			6925	2163.6

随着价格逐步回升，远期曲线趋弱，上海原油期货库存逐步去化，资源辐射至周边国家和地区。2021 年，期初库存 2925.7 万桶，期末库存 628.7 万桶（图 3）。年交割量 2163.6 万桶，其中巴士拉轻油共交割 1551.1 万桶，占年度总交割量 71.7%；新引入的穆尔班原油交割 60.8 万桶，占比 2.8%（表 6）。此外，全年期转现 444.5 万桶。交割出库的原油以报关进口和转保税现货为主，也有部分原油复运出境至韩国、缅甸和印度等周边国家和地区。

图3 上海原油期货库存情况

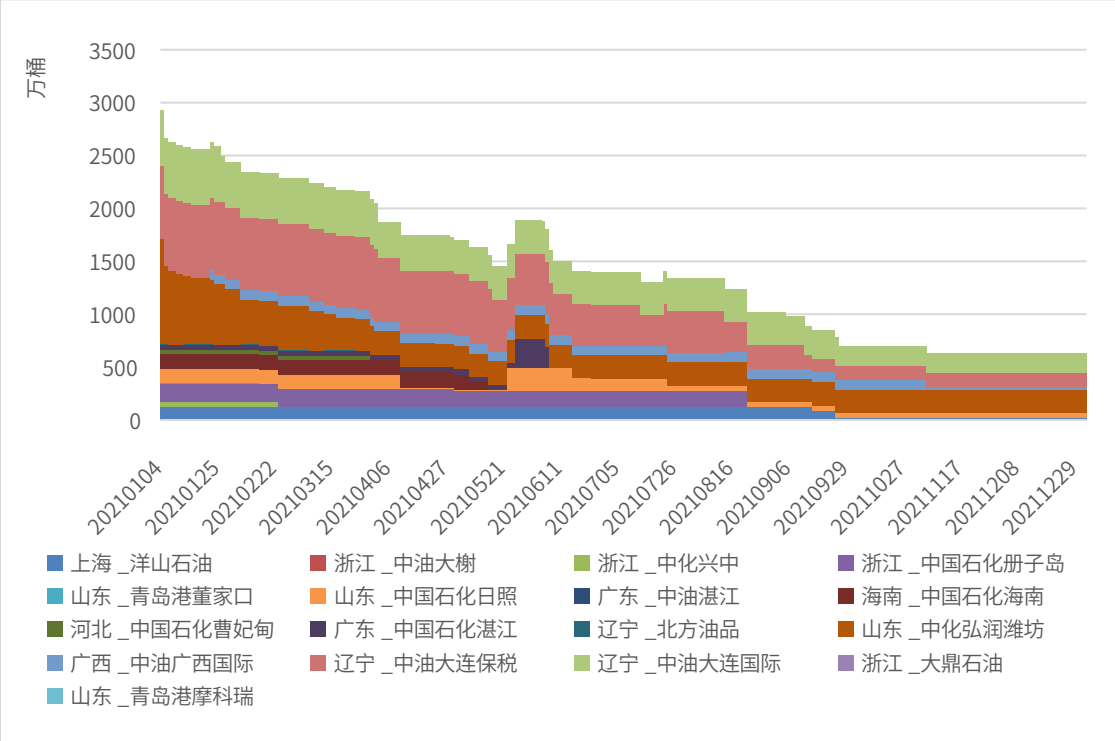


表6 各油种交割情况

合约	交割货款（亿元）	交割结算价（元/桶）	月交割量[1]（万桶，不含期转现）	阿曼原油	巴士拉轻油	上扎库姆原油	迪拜原油	穆尔班原油
SC2101	5.7	290.3	199.2	0.0	187.5	11.2	0.5	-
SC2102	7.3	322.5	229.1	0.0	217.2	11.4	0.5	-
SC2103	2.4	400.6	60.7	0.0	60.0	0.7	0.0	-
SC2104	6.6	380.0	174.3	0.0	152.3	11.5	10.5	-
SC2105	5.2	404.0	129.6	0.0	108.1	21.5	0.0	-

[1]注：2021年卡塔尔海洋油、马西拉、胜利原油暂无交割。

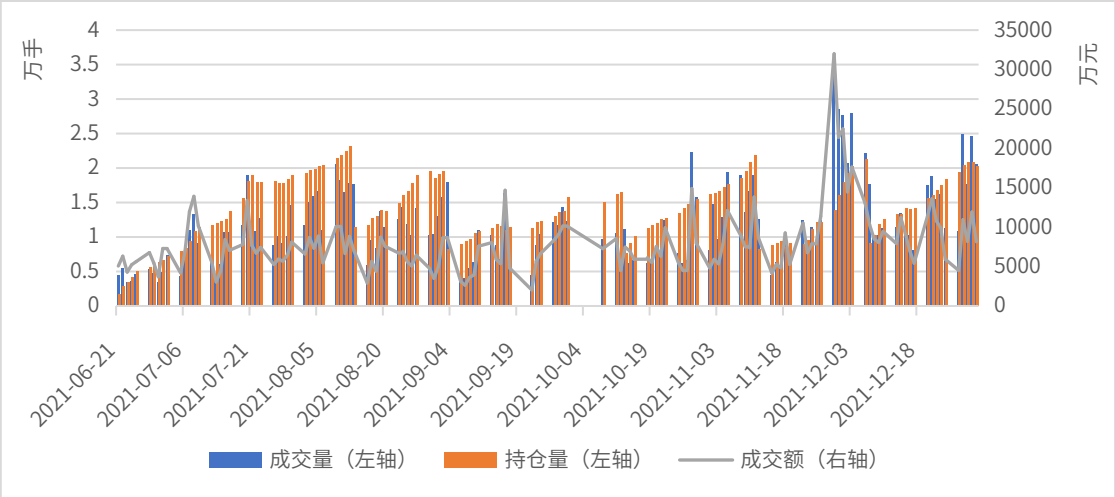
SC2106	21.0	421.8	500.5	0.0	327.5	173.0	0.0	-
SC2107	5.1	454.5	112.4	19.0	34.4	40.0	19.0	0.0
SC2108	4.8	433.7	111.1	17.0	23.3	32.8	19.0	19.0
SC2109	20.8	423.0	492.6	18.3	345.9	90.4	19.0	19.0
SC2110	1.8	474.7	37.8	0.7	16.2	0.0	20.9	0.0
SC2111	0.0	521.1	0.2	0.0	0.2	0.0	0.0	0.0
SC2112	5.8	498.1	116.1	0.0	78.5	14.8	0.0	22.8
合计	86.5	-	2163.6	55.0	1551.1	407.3	89.4	60.8
占比	-	-	-	2.5%	71.7%	18.8%	4.1%	2.8%

四、原油期权成功上市，多层次衍生品市场体系初具规模

2021 年 6 月 21 日，以原油期货为标的的原油期权在上海国际能源交易中心成功上市，成为我国首批以人民币计价对外开放的期权品种。原油期权上市，是对原油期货市场有效补充，对更好地满足企业多元化风险管理需求具有积极作用。

上市以来，原油期权市场运行平稳，成交持仓快速增长，境内外交易者参与积极，期权定价合理，市场影响初步显现。2021 年全年累计运行 133 个交易日，累计成交量 156.25 万手，累计成交额 105.21 亿元，日均成交量 1.17 万手，日均成交额 7910 万元，日均持仓量 1.39 万手。

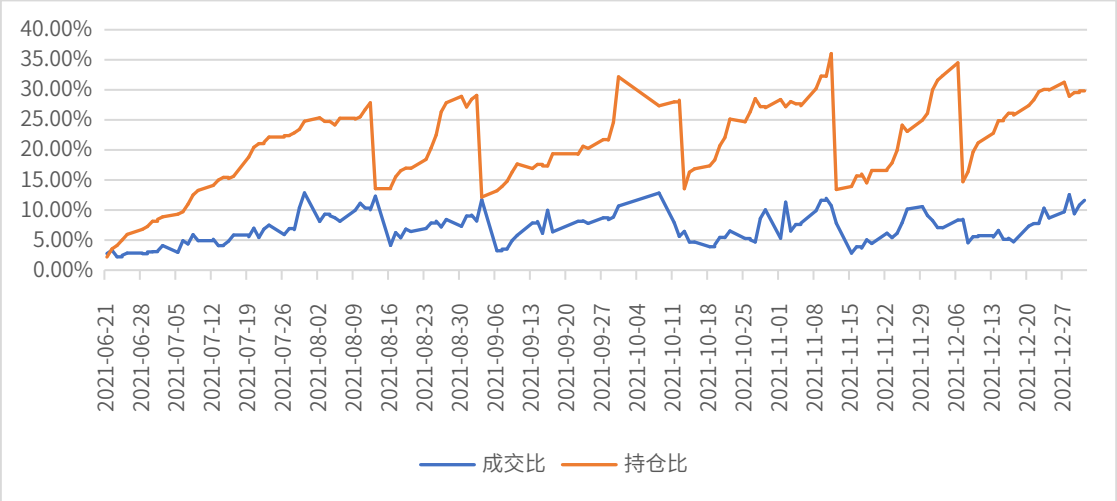
图4 2021年原油期权成交持仓情况



数据来源：上海国际能源交易中心

从相对规模来看，2021 年原油期权成交量与标的期货成交量的日均比例为 6.97%，持仓量与标的期货持仓量的日均比例为 21.05%。

图5 2021年原油期权成交量、持仓量相对标的期货情况



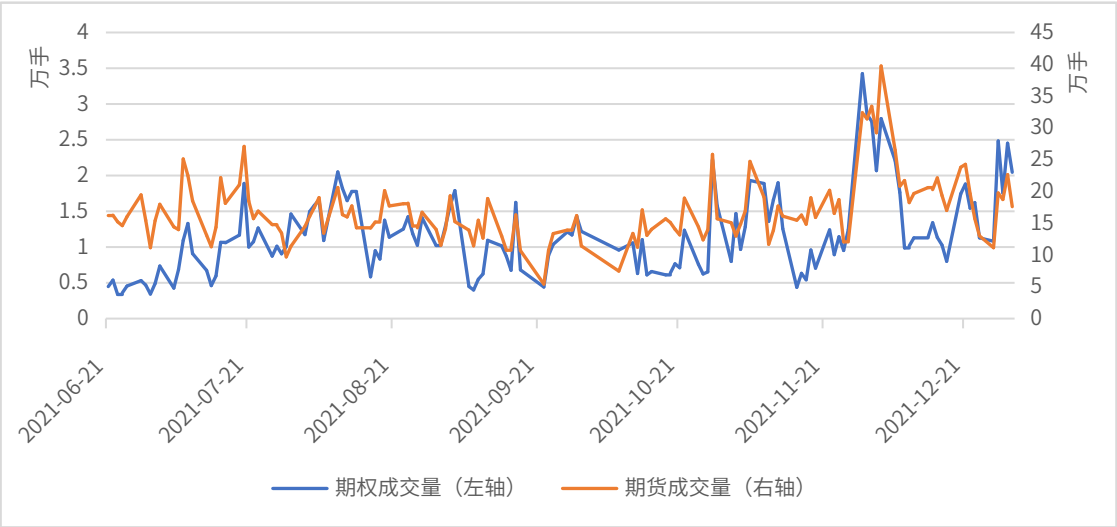
数据来源：上海国际能源交易中心

（一）与标的期货市场联动紧密，助力高质量发展

作为原油期货的衍生产品，原油期权是原油期货市场的有效补充，两个市场联动紧密。从价格联动关系来看，2021 年原油期权市场合成的期货价格与标的期货市场价格相关性超过 0.9，两个市场价格呈现紧密关系。

从成交量来看，原油期权与标的期货呈现良好联动。当标的期货成交量大幅变化时，期权的成交量也相应变化较大，表明投资者积极利用原油期货和期权同步、同向管理市场风险。

图6 原油期权成交和标的期货成交走势情况



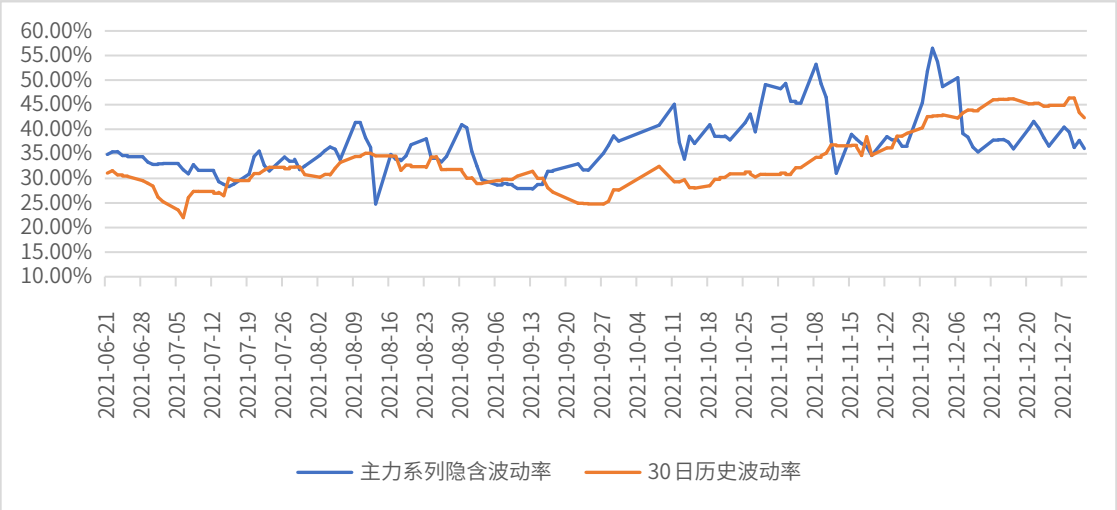
数据来源：上海国际能源交易中心

从风险管理策略来看，原油期权与标的期货高度融合。上市以来，产业链企业积极参与，通过“搭积木”方式组合原油期货、期权形成各种个性化风险管理策略，有效地应对市场价格方向性风险和波动性风险，提升期货市场风险管理水平。

（二）期权定价合理，助力场内场外协调发展

原油期权上市后，投资者积极参与，期权市场定价合理。2021 年原油期权主力系列隐含波动率基本维持在 30%-50% 之间，整体略高于标的期货历史波动率，两者走势总体较为一致，定价较为合理。原油期权上市之后，由于定价合理、公允性强，部分投资者从单纯参与场外期权，转向同时利用场内场外两个市场，原油期权也逐渐成为原油以及下游品种场外市场定价重要的锚定。

图7 原油期权主力系列隐含波动率和历史波动率走势情况



数据来源：上海国际能源交易中心

结束语

上海原油期货上市 4 年来，中国供需有效表达，市场规模快速发展，参与主体不断丰富，运行质量全面提升，生态体系日趋完善。上海原油期货更直接、更准确、更快速地反映中国供需，日益成为国际原油市场不可或缺的有机组成部分，促进国际原油市场价格发现和良性发展的正向溢出效应初步显现。2022 年，我们将紧跟国际期现货市场发展变化，不断优化交割油种，创新交易机制，为实体经济健康发展保驾护航。

境内外研究成果

Yang 等（2020）使用协整检验、线性和非线性因果关系检验研究 2018 年 3 月至 2019 年 2 月期间 INE 原油期货的定价效率。文章发现，INE 原油期货价格是 Oman 原油现货价格的格兰杰原因，而 WTI 和 Brent 现货价格是 INE 原油期货价格的格兰杰原因。文章从而得出结论：尽管 INE 原油期货市场的定价效率仍然低于 WTI 和 Brent 现货市场，但其在亚太地区已经变得有效。

参考文献：Yang, C., Lv, F., Fang, L., & Shang, X. (2020). The pricing efficiency of crude oil futures in the Shanghai International Exchange. Finance Research Letters, 36, 101329–. https://doi.org/10.1016/j.frl.2019.101329

Yang 和 Zhou（2020）使用 5 分钟频度日内数据研究 INE 原油期货上市后首 3 个月内，其与 WTI、Brent 和 Oman 原油期货之间的关系。通过 VECM-MGARCH 模型，文章发现，原油期货之间存在协整关系，并且在受到负面价格冲击时，INE 原油期货与国际原油期货市场之间的非对称相关性更强。文章还指出，INE 原油期货与主要原油期货（WTI 和 Brent）之间的联系比 Oman 原油期货更强，尤其是在其夜盘交易时段。

参考文献：Yang, J., & Zhou, Y. (2020). Return and volatility transmission between China’s and international crude oil futures markets: A first look. The Journal of Futures Markets, 40 (6), 860–884. https://doi.org/10.1002/fut.22103

Zhang 和 Ma（2020）采用 2018 年 3 月至 10 月期间的 15 分钟频度日内数据，使用 Hasbrouck（1995）信息份额和 Garbade-Silber 模型研究 INE 原油期货相较于 Brent 原油期货的价格发现情况，并且使用 Diebold 和 Yilmaz（2012）模型研究 INE、WTI 和 Brent 原油期货之间的风险转移和溢出情况。文章发现，INE 原油期货贡献了 48% 的信息份额，而 Brent 原油期货贡献了 52%，并且 INE 市场是三个原油市场中波动性溢出的最大传递者。

参考文献：Zhang, Y. J., & Ma, S. J. (2021). Exploring the dynamic price discovery, risk transfer and spillover among INE, WTI and Brent crude oil futures markets: Evidence from the high‐frequency data. International Journal of Finance & Economics, 26(2), 2414-2435.

Yang 等（2021）从风险溢出角度出发，通过数个 GARCH 模型获得风险值（VaR）的连接网络。文章发现，2018 年 3 月至 2020 年 4 月期间，国际原油期货市场高度互联互通，并且 INE 原油期货一直是 Brent 和 WTI 原油期货的净风险接受者，尤其是在 Covid-19 爆发之后。

参考文献：Yang, Y., Ma, Y.-R., Hu, M., Zhang, D., & Ji, Q. (2021). Extreme risk spillover between Chinese and global crude oil futures. Finance Research Letters, 40, 101743–101743. https://doi.org/10.1016/j.frl.2020.101743

Li，Huang 和 Li（2021）研究了 INE 原油期货与 Oman 原油和 OPEC 参考的一揽子原油现货之间的价格相关性，以及 INE 原油期货的对冲效果。采用 GO-GARCH 模型分析 2018 年 3 月至 2019 年 6 月期间的每日价格，研究发现，相较于 WTI 和 Brent 原油期货，INE 原油期货与现货市场之间的价格相关性更高，且 INE 对现货的对冲有效性也更高。

参考文献：LI, J., HUANG, L., & LI, P. (2021). Are Chinese crude oil futures good hedging tools? Finance Research Letters, 38, 101514–. https://doi.org/10.1016/j.frl.2020.101514

Lv，Yang 和 Fang（2020）研究 INE 原油期货与 Brent 和 WTI 原油期货相比，是否可以更好地帮助投资者对冲中国石油化工相关股票的风险。采用 2018 年至 2019 年数据以及 DCC、DECO 和 Block DECO 模型，研究发现，INE 原油期货在对冲风险和分散投资组合方面比 WTI 原油期货表现更好，但与 Brent 原油期货相比则不然。

参考文献：Lv, F., Yang, C., & Fang, L. (2020). Do the crude oil futures of the Shanghai International Energy Exchange improve asset allocation of Chinese petrochemical-related stocks? International Review of Financial Analysis, 71, 101537–. https://doi.org/10.1016/j.irfa.2020.101537

Yi，Yang 和 Li（2021）重点研究了 2018 年 3 月至 2020 年 6 月期间宏观经济不确定性对 INE 原油期货的解释和预测能力。作者使用 CARCH-MIDAS 模型解决数据频率差异的问题，发现在主要原油消费国——美国、中国和日本，以及主要原油出口国——英国、加拿大和俄罗斯的地缘政治风险、经济政策不确定性和传染病大流行等因素中，英国和日本的因素在预测 INE 原油期货波动中发挥的作用更大。

参考文献：Yi, A., Yang, M., & Li, Y. (2021). Macroeconomic Uncertainty and Crude Oil Futures Volatility–Evidence from China Crude Oil Futures Market. Frontiers in Environmental Science, 9. https://doi.org/10.3389/fenvs.2021.636903

免责声明：上述引用内容仅代表相应作者个人观点，不代表上海国际能源交易中心观点，仅供市场参考，上海国际能源交易中心不对上述引用内容所涉及的版权问题负法律责任。

上海原油期货年度之“最”

表1. 价格表现									
开盘价	最高价	最低价	收盘价	30日历史波动率（%）			期现价差（元/桶）		
				最高	最低	平均	最高	最低	平均
302.9	546.7	301.6	499.0	8.92	3.64	5.98	32.81	-51.16	-18.91

表2. 交易情况							
交易						持仓	
累计成交（万手）	累计成交额（万亿）	日均成交（万手）	日均成交额（亿）	最高成交（万手）	日盘占比(%)	日均持仓（万手）	最高持仓（万手）
4264.52	18.50	17.5	761.15	39.73	37.53	7.5	10.83

表3. 交割情况								
累计交割(万桶,不含期转现)	累计交割额（亿元）	交割量最大合约	单月最大交割量（万桶）	交割量最大油种	最大油种交割量（万桶）	交割量最大油库	最大油库交割量（万桶）	期转现（万桶）
2163.6	92.2	SC2106	500.5	巴士拉轻油	1551.1	中化弘润	811.0	444.5

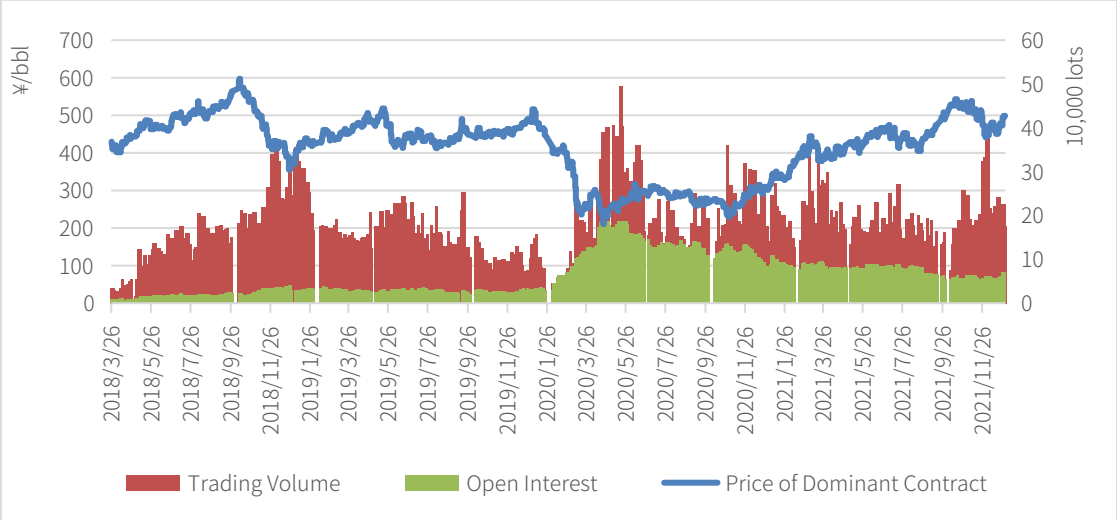
2022 Development Report of Shanghai Crude Oil Futures and Options Market

In 2021, the world economy began to recover despite the persisting pandemic. With the strong rebound of the crude oil demand, oil price also surged. Shanghai crude oil futures (product code "SC") showed a high price correlation with the overseas oil prices and faithfully reflected the regional supply-demand dynamics. Trading volume of SC rose steadily; activities of institutional and overseas traders increased sharply; and the market was more connected with the overseas markets than ever. On June 21, 2021, Shanghai International Energy Exchange (INE) launched the crude oil options, marking the coordinated development of China's multi-layered energy derivatives market.

I. High price correlation with overseas markets and accurate indicator of regional supply-demand

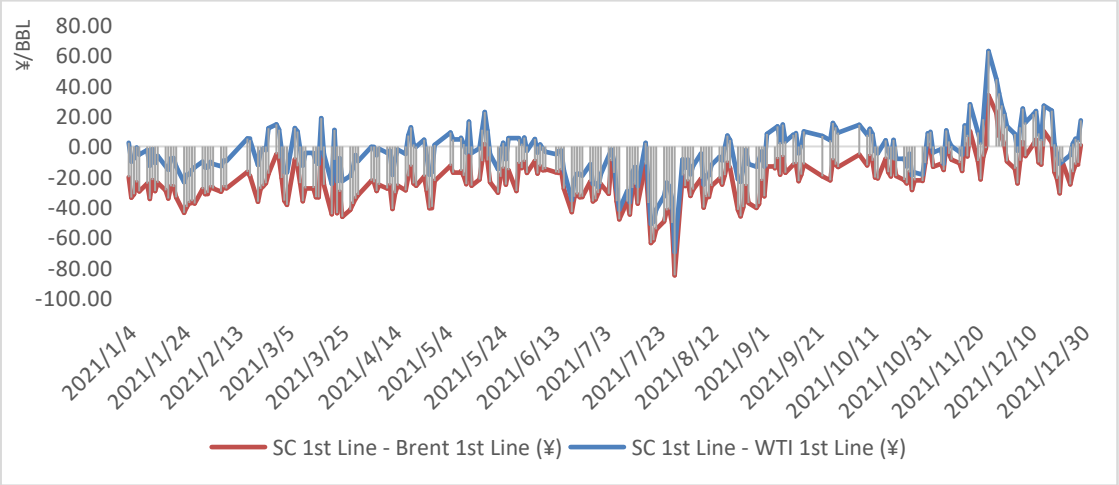
In 2021 with the rising vaccination rate worldwide, many countries lifted their travel restrictions, helping the crude oil demand to rebound. But because recovery was slow on the supply side, the global oil market, in reversal of the stock buildup in 2020, was fast shedding the existing inventories. As of the end of 2021, crude oil stock across the globe hit a five-year low for comparable periods. Notably, SC contracts were an accurate indicator of the changes in market fundamentals—price went up as the inventory declined. The price of the dominant SC contract opened at ¥302.9 per barrel (bbl) for the year and closed at ¥499.0/bbl at the end of the year, gaining 64.74%. High and low prices were ¥546.5 and ¥301.6 respectively (Figure 1). The spread between the first-line SC contract and the first-line Brent crude contract was as high as ¥33.7/bbl and as low as −¥84.9/bbl, averaging −¥22.2/bbl over the course of the year (Figure 2).

Figure 1: Overview of Shanghai Crude Oil Futures (SC)



Source: INE

Figure 2: Spread Between SC and Overseas Crude Oil Futures



Source: INE and Reuters

The price of SC, though closely mirroring the movements of its counterparts in overseas markets, also showed a certain level of autonomy due to the increasing prominence of the "Chinese factors." In 2021, the SC-Brent and SC-WTI correlation coefficients were 0.977 and 0.969, respectively, higher than the 2020 figures of 0.961 and 0.894. Cointegration test on the SC, Brent, and WTI futures prices showed two long-term equilibrium relationships between them, indicating that SC is now a part of and is interacting with the international crude oil futures market. In addition, compared with Brent and WTI, SC has been a better barometer of the Asia-Pacific market. Granger causality test showed reciprocal causation between Brent and SC and between Brent and WTI. However, no notable causation relationship was found between SC, which represents the Asia-Pacific market, and WTI, representing the North American market. These tests revealed that Brent is mutually influential with SC and WTI individually, but the SC and WTI markets are relatively independent from each other.

The Shandong Province is home to many of China's independent refineries, and their capacity utilization rate provides a general picture of the marginal changes in crude oil supply and demand in China. Their utilization rate began to fall in February 2020 at the outbreak of COVID-19, and hit the lowest point of 36% in mid-February. As China managed to contain the pandemic and the economy reopened, the utilization rate rebounded to above 60% at the end of March. It then further climbed to 70% by the end of April and stabilized at around 75%. During these months, SC prices also demonstrated lesser declines and earlier rebound than overseas futures products, giving an accurate picture of the demand changes in China. The Granger causality test based on the weekly utilization rate of Shandong-based independent refineries shows that, at a 5% significance level, SC prices Granger-caused the refinery utilization rate and vice versa, i.e., these two are statistically mutually causal. According to the impulse response analysis, crude oil price shocks produce a mostly positive, albeit much delayed, effect on the refinery utilization rate, peaking during the sixth to seventh time intervals. This shows that the utilization rate of Shandong-based independent refineries may to some extent be used to analyze SC prices, but without much immediacy at the moment.

II.Improving price discovery in international oil markets and promoting positive inter-futures market interactions

As market interest and engagement increases, Shanghai crude oil futures market is growing and seeing an improving investor structure. In 2021, SC continued to post strong trading volume and open interest figures, and was only behind WTI and Brent crude futures in market size—climbing to the 13th spot in the Futures Industry Association's global ranking of the most traded energy commodity futures and options products. The SC market now boasts overseas clients from more than 20 countries and regions in 6 continents, as well as 3 overseas special participants and 75 registered overseas intermediaries.

In terms of market performance in 2021, trading volume reached 42.645 million lots (single-counted here and hereinafter) and turnover totaled ¥18.5 trillion, up 2.6% and 54.6% year-on-year, respectively. The average daily volume and open interest were 175,000 lots and 75,000 lots. In terms of participant structure, institutional traders, including general and special corporate entities, contributed over 50% of the daily trading volume and around 70% of the open interest, up 8.1% and 7.6% from 2020, respectively. Trading volume and open interest of overseas participants rose by 6.9 and 6.5 percentage points over 2020. The proportion of trading volume, open interests and hedging of institutional traders ranks the top among domestic futures. These institutional traders include leading enterprises in oil industry, multinational trading companies, investment banks, funds and asset management companies.

Table 1: Trading and Delivery of Shanghai crude oil futures Since Launch

Year	Daily Trading Volume (10,000 lots)	Daily Open Interest (10,000 lots)	Total Delivery (10,000 bbls)
2021	17.5	7.5	2163.6
2020	17.1	11.9	8515.9
2019	14.2	2.9	1761.8
2018	14	2	284.9

SC has filled a void in China's and even in the Asian-Pacific crude oil market and helped improve price linkage in the international markets, becoming an integral component of them in the process. Benefiting from this cross-market linkage, SC not only is developing rapidly itself as a futures product and has enhanced the impact of the Chinese market on the international market, it also has increased the vitality of the overseas crude oil futures markets. Granger causality test shows that, between 2018 and 2021, SC prices became a much more prominent Granger cause for the Brent and WTI markets, evidencing its growing influence on them (Table 2). **In terms of the share of day-time trading volume**, trading of Brent and WTI futures during the Asian trading hours of 9:00–11:30 and 13:30–15:00 Beijing time accounted for 4.71% and 5.30% of their respective total daily trading volumes, rising from 2.87% and 2.91% respectively from before the listing of SC, with statistical significance increasing by 64.12% and 82.13% (Table 3). **In terms of trading in the opening hours**, trading of Brent and WTI during the 30 minutes before and after the opening of the SC market in the morning and afternoon trading sessions accounted for 1.68% and 2.42% of their respective total daily trading volumes, rising from 0.81% and 1.19% respectively from before the listing of SC, with statistical significance increasing by 107.41% and 103.37% (Table 4).

Table 2: Granger Causality Test Results (2018-2021)

	2018年	2019年	2020年	2021年
WTI→SC	3.818	14.129***	1.131	4.013
Brent→SC	20.926***	10.491***	42.961***	8.359***
SC→WTI	0.490	0.318	4.102	5.569
Brent→WTI	2.732	0.751	140.870***	0.657
SC→Brent	0.486	0.457	12.611***	8.329***
WTI→Brent	7.126**	1.583	34.384***	0.927

Source: INE and Reuters

Table 3: Share of Trading Volumes of European and U.S. Crude Oil Futures Markets During Asian Trading Hours

Share of Daytime Trading Volume	Brent	WTI
2015/3/26 – 2018/3/25 (3 years before the launch of SC)	2.87%	2.91%
2018/3/26 – 2021/12/31 (launch of SC till end of 2021)	4.71%	5.30%
2019	4.17%	4.52%
2020	4.85%	5.44%
2021	5.61%	6.13%

Source: INE and Reuters

Table 4: Share of Trading Volumes of European and U.S. Crude Oil Futures Markets During the Opening Hours

Share of Trading Volume around Opening Hours (8:30–9:30 and 13:00–14:00 Beijing Time)	Brent	WTI
2015/3/26 – 2018/3/25 (3 years before the launch of SC)	0.81%	1.19%
2018/3/26 – 2021/12/31 (launch of SC till end of 2021)	1.68%	2.42%
2019	1.46%	2.03%
2020	1.83%	2.62%
2021	2.04%	2.76%

Source: Reuters

III.Capitalizing on the domestic and overseas markets to set up more delivery depot locations for better allocation of resources

In 2021, in response to market needs, INE continued to expand the capacity of delivery depots for crude oil futures, increase their service radius, and optimize their locations. Notably, INE welcomed the first multinational warehousing company in its list of designated delivery depots, Qingdao Haiye Mercuria Storage Terminal Co., Ltd., and a large private warehousing company, Dading Petroleum Logistics, which together have brought 3.692 million barrels of additional storage capacity and operator diversity to INE' s delivery network. As of the end of 2021, INE offered 16 crude oil delivery depots, with a total approved storage capacity of 69.25 million barrels (Table 5).

Table 5: Delivery Depots and Delivery Volume of Shanghai Crude Oil Futures in 2021

S/N	Designated Delivery Storage Warehouse	Depot	Storage Capacity in Use (1,000 bbls)	2021 Delivery Volume (1,000 bbls, excluding EFP)
1	Sinopec Petroleum Reserve Co., Ltd.	SPRC Caofeidian	200	53.3
2		SPRC Rizhao	520	211.7
3		SPRC Cezidao	350	41.5
4		SPRC Zhanjiang	416	281.6
5		SPRC Hainan	300	0
6	PetroChina Fuel Oil Co., Ltd.	PetroChina Zhanjiang	311	0
7	Sinochem-Xingzhong Oil Staging (Zhoushan) Co., Ltd.	Sinochem Xingzhong	210.1	0
8	Dalian PetroChina International Warehousing & Transportation Co., Ltd.	PetroChina Dalian	829.5	242.2
9		PetroChina Dalian Intl	1080	220.7
10		PetroChina Guangxi Intl	120	117.4
11	Shandong Port Group Co., Ltd.	Qingdao Port Shihua	239.2	0
12		Qingdao Port Mercuria	239.2	0
13	Yangshan Shengang International Oil Logistics Co., Ltd.	Yangshan Oil	126	163
14	Dalian North Oil Petroleum Logistics Co., Ltd.	North Petroleum	54	21.2
15	Sinochem-Hongrun Oil Staging (Weifang) Co., Ltd.	Sinochem Hongrun	1800	811
16	Dading Petroleum Logistics Co., Ltd.	Dading Petroleum	130	0
Total			6925	2163.6

As oil price recovers and the forward curve flattens, crude oil inventory in China for the delivery of SC is also dropping, with some of the stocks being shipped to neighboring countries and regions. In 2021, the futures stock started the year at 29.257 million barrels and finished at 6.287 million barrels (Figure 3). Delivery in the year totaled 21.636 million barrels, including 15.511 million barrels of Basra Light (71.7% of total) and 608,000 barrels of the newly added Murban Crude (2.8%) (Table 6). Delivery through EFP was 4,445,000 barrels. Most of the crude oil delivered was imported through the customs or converted from bonded physicals; some was re-exported to neighboring countries including South Korea, Myanmar, and India.

Figure 3: Crude Oil (Futures) Stocks in China

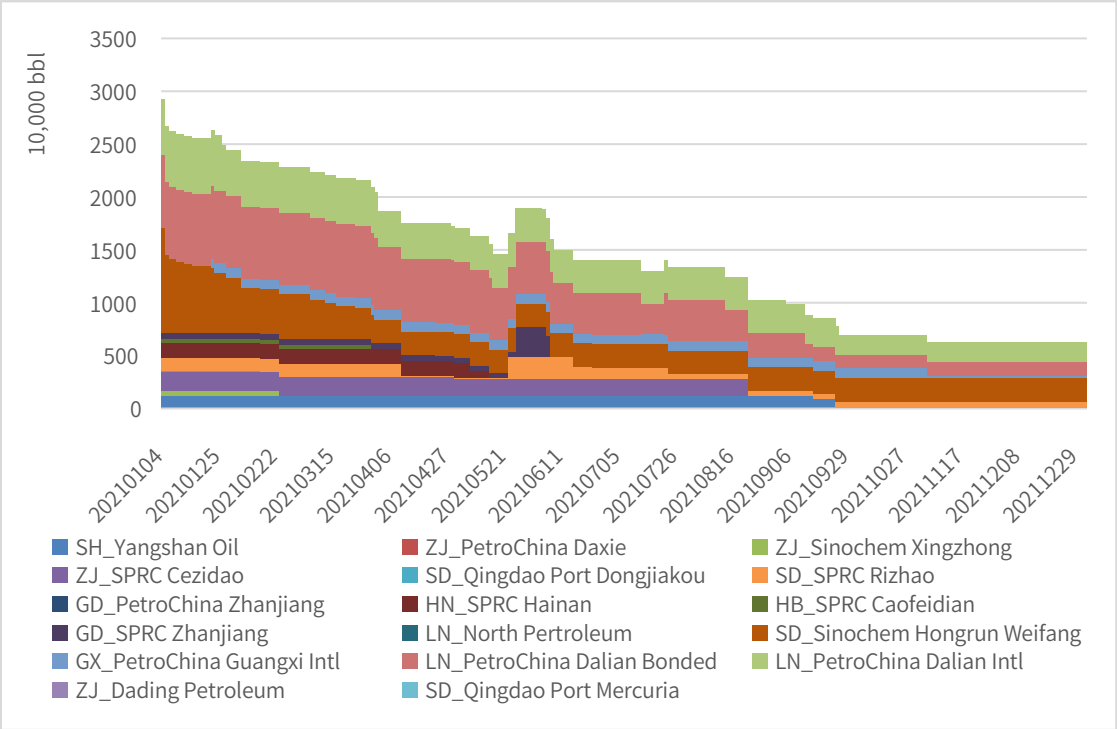


Table 6: Crude Oil Deliveries

Contract	Delivery Payment (¥mn)	Final Settlement Price (¥/bbl)	Monthly[1] Delivery (1,000 bbls, excluding EFP)	Oman	Basra Light	Upper Zakum	Dubai	Murban
SC2101	570	290.3	1,992	0.0	1,875	112	5	-
SC2102	730	322.5	2,291	0.0	2,172	114	5	-
SC2103	240	400.6	607	0.0	600	7	0	-
SC2104	660	380.0	1,743	0.0	1,523	115	105	-
SC2105	520	404.0	1,296	0.0	1,081	215	0	-

[1] Note: No Qatar Marine, Masila, and Shengli crude oil was delivered in 2021.

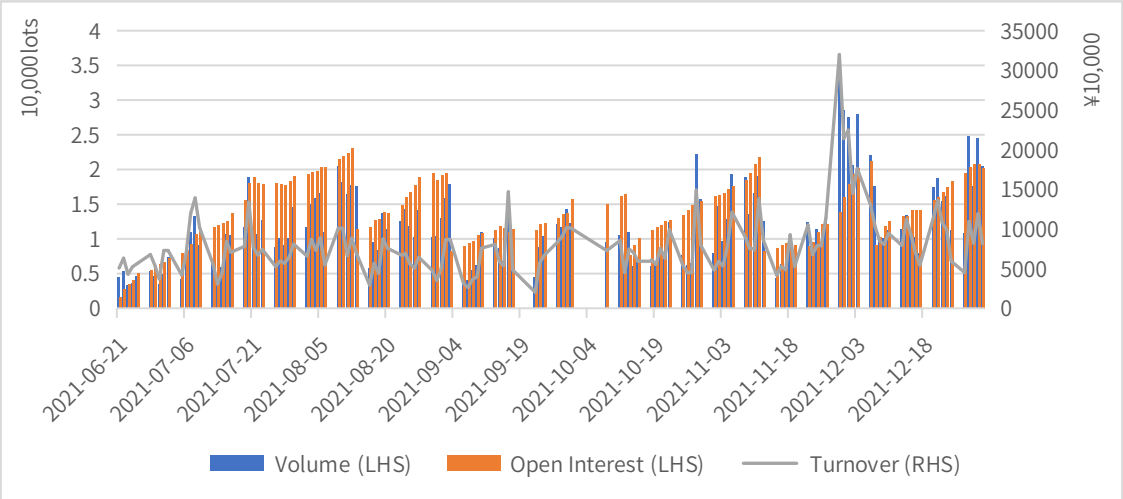
SC2106	2,100	421.8	5,005	0	3,275	1,730	0	-
SC2107	510	454.5	1,124	190	344	400	190	0
SC2108	480	433.7	1,111	170	233	328	190	190
SC2109	2,080	423.0	4,926	183	3,459	904	190	190
SC2110	180	474.7	378	7	162	0	209	0
SC2111	0	521.1	2	0	2	0	0	0
SC2112	580	498.1	1,161	0	785	148	0	228
Total	8,650	-	21,636	550	15,511	4,073	894	608
Percentage	-	-	-	2.5%	71.7%	18.8%	4.1%	2.8%

IV.Listing of crude oil options a further boost to the fledgling multi-layered derivatives market

On June 21, 2021, the crude oil options (on SC contracts) were successfully listed on INE, becoming China's first RMB-denominated options product accessible to overseas investors. The crude oil options supplement the SC market and unlock additional risk management strategies for enterprises.

The crude oil options market has been running smoothly since launch, with rapidly rising trading volume and open interest and active participation by both domestic and overseas investors. The product has shown fair prices and rising market functions. In 2021, a total of 1,562,500 contracts valued at ¥10.521 billion were traded over 133 trading days, averaging 11,700 lots and ¥79.1 million per day. Average daily open interest was 13,900 lots.

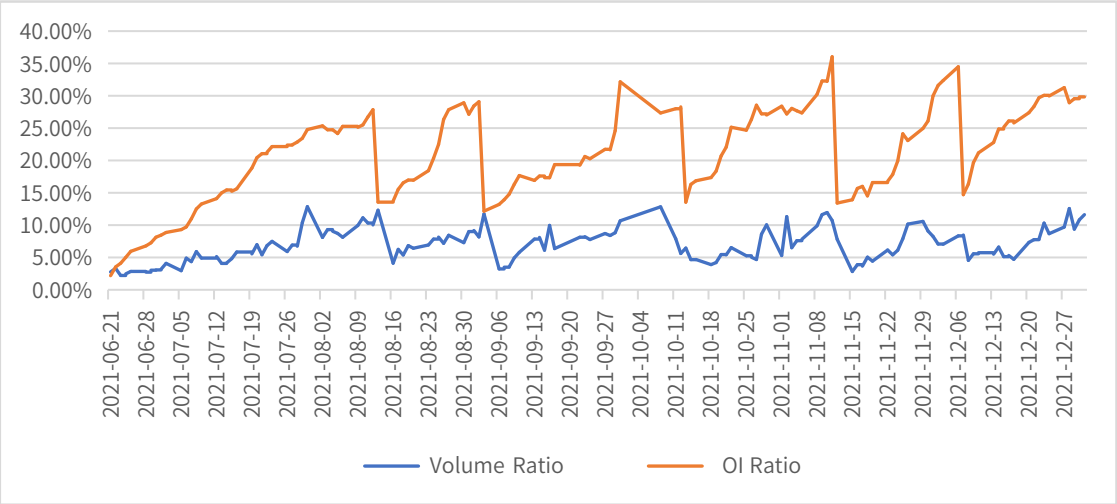
Figure 4: Crude Oil Options Volume and Open Interest in 2021



Source: INE

In 2021, the average daily options-to-futures ratio for INE crude oil was 6.97% by trading volume and 21.05% by open interest.

Figure 5: Crude Oil Options-to-Futures Ratio by Volume and Open Interest in 2021



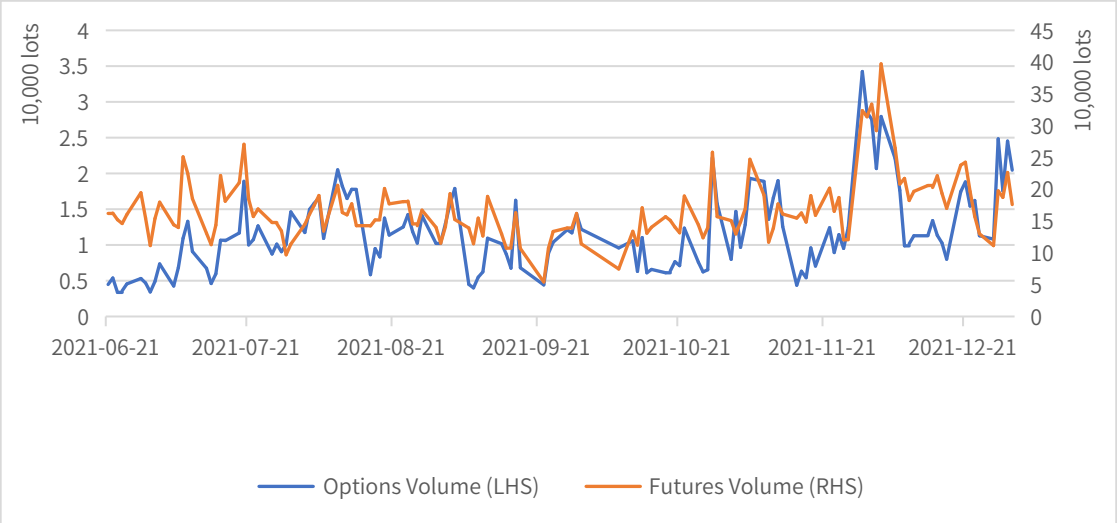
Source: INE

(I)Close futures-options linkage enables high-quality market development

As a derivative of INE crude oil futures, INE crude oil options effectively supplement and closely track the dynamics of the SC market. In 2021, options-derived futures prices and the futures market prices for the corresponding contracts were closely linked at a correlation coefficient of over 0.9.

Similar correlation between the two markets was also observed in terms of trading volume: a large change in futures trading volume would be accompanied by a proportionally large change in the options trading volume, indicating that investors were actively taking advantage of the near-identical movements of the two markets to manage market risks.

Figure 6: Trading Volume of INE Crude Oil Options and INE Crude Oil Futures



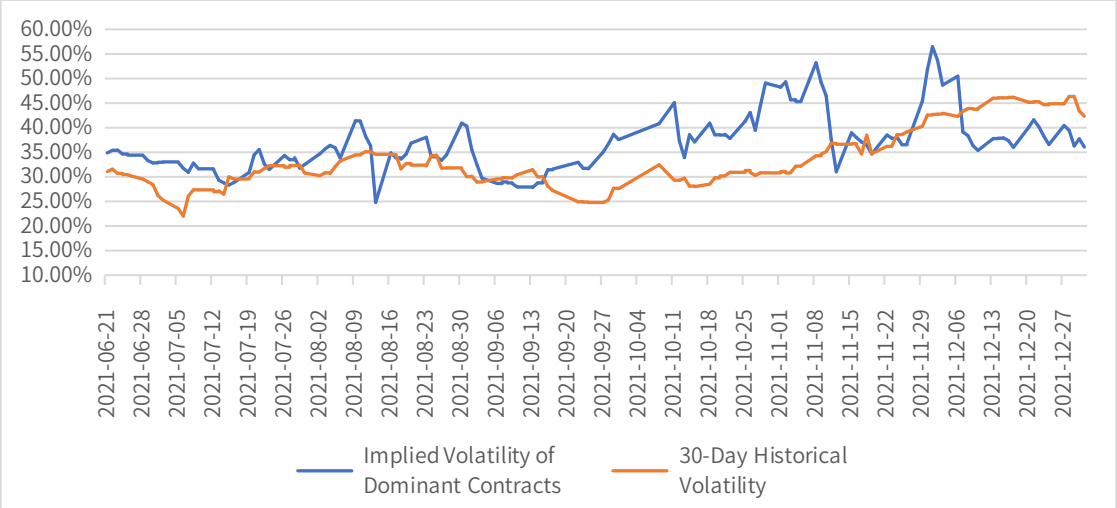
Source: INE

Indeed, in risk management strategies the crude oil options and the crude oil futures are a natural match for each other. By combining the two into various personalized risk management strategies, enterprises in the oil industry have found success in taming price trends and fluctuations and become better at managing futures market risks.

(II) Reasonable options pricing promotes coordinated development of the exchange and OTC markets

INE crude oil options gained instant popularity upon launch and have been reasonably priced. In 2021, the implied volatility of the dominant contracts mostly stayed within the 30-50% band, slightly higher than the historical volatility of the underlying futures. The two volatility values showed similar movement trends and the options have been reasonably priced. Because of the fair and reasonable pricing of INE crude oil options, many investors of OTC options are now also active in the exchange market as the INE crude oil options gradually becomes a pricing benchmark in the OTC market for crude oil and downstream petroleum products.

Figure 7: Implied Volatility and Historical Volatility of Dominant Crude Oil Options Contracts



Source: INE

Conclusion

In the four years since its listing, the INE crude oil futures has been a faithful indicator of the supply-demand situation in China. The market has been growing rapidly, with an increasingly varied range of participants, improving operations, and an ever-stronger ecosystem. Shanghai crude oil futures is not only a more direct, accurate, and timely proxy for the domestic market supply and demand, but also becoming an integral component of the international crude oil market and helping promote price discovery in and the healthy development of that market. In 2022, SHFE will keep pace with the changes in the international spot and futures markets, optimize the range of deliverable crude oils, and introduce innovative trading mechanisms to support the healthy development of the real economy.

Domestic and Overseas Studies on INE Crude Oil Futures

Yang et al. (2020) investigated the pricing efficiency of INE crude oil futures for the period from March 2018 to February 2019 with cointegration and Granger causality tests. They found that the INE futures price was the Granger cause of the Oman spot price, and the WTI and Brent spot prices were in turn the Granger cause of the INE futures price. The paper thus concludes that although the INE crude oil futures market still shows lower pricing efficiency than the WTI and Brent spot markets, it is efficient in the Asia-Pacific region.

Reference: Yang, C., Lv, F., Fang, L., & Shang, X. (2020). The pricing efficiency of crude oil futures in the Shanghai International Exchange. Finance Research Letters, 36, 101329-. https://-doi.org/10.1016/j.frl.2019.101329

Yang and Zhou (2020) examined the relationship between INE crude oil futures (SC) and WTI, Brent, and Oman crude oil futures within the first three months of the listing of SC using intraday data at 5-minute intervals. With the help of the VECM-MGARCH model, the paper found a cointegrating relationship between these futures products, and that following a negative price shock, the asymmetric volatilities and correlations between SC and international crude oil futures markets became stronger. The paper also found that SC showed stronger linkage with WTI and Brent futures than Oman futures did, especially in the night trading hours.

Reference: Yang, J., & Zhou, Y. (2020). Return and volatility transmission between China' s and international crude oil futures markets: A first look. the Journal of Futures Markets, 40(6), 860-884. https://doi.org/10.1002/fut.22103

Zhang and Ma (2020) built the Hasbrouck (1995) information share model and Garbade-Silber model with the 15-minute interval intraday data from March to October 2018 to study the price discovery function of INE crude oil futures compared with Brent crude futures, and used the Diebold-Yilmaz model to measure the risk transfer and spillover effect among INE, WTI, and Brent futures markets. The results show that the INE crude oil futures contributed 48% of the information share, compared with the 52% share of Brent crude futures, and that the INE market was the largest transmitter of volatility spillover among the three markets.

Reference: Zhang, Y. J., & Ma, S. J. (2021). Exploring the dynamic price discovery, risk transfer and spillover among INE, WTI and Brent crude oil futures markets: Evidence from the high‐frequency data. International Journal of Finance & Economics, 26(2), 2414-2435.

Yang et al. (2021) built several GARCH models to obtain the value at risk (VaR) connectedness networks. They found that, between March 2018 and April 2020, the international oil markets were highly connected, with the INE crude oil futures persistently acted as a net receiver of the risks from Brent and WTI, especially following the Covid-19 outbreak.

Reference: Yang, Y., Ma, Y.-R., Hu, M., Zhang, D., & Ji, Q. (2021). Extreme risk spillover between Chinese and global crude oil futures. Finance Research Letters, 40, 101743-101743. https://doi.org/10.1016/j.frl.2020.101743

Li, Huang, and Li (2021) investigated the price correlations between the INE crude oil futures and the spot prices of Oman and the OPEC Basket, as well as the hedging effectiveness of the INE product. They analyzed the intraday prices from March 2018 to June 2019 with a GO-GARCH model and found that compared with WTI and Brent crude futures, INE crude oil futures showed higher price correlation with the spot markets and was a more effective hedging tool.

Reference: Li, J., Huang, L., & Li, P. (2021). Are Chinese crude oil futures good hedging tools? Finance Research Letters, 38, 101514-. https://doi.org/10.1016/j.frl.2020.101514

Lv, Yang, and Fang (2020) looked at whether investors can better hedge against the risks of Chinese petrochemical stocks with the INE crude oil futures compared with the Brent and WTI crude futures. By constructing the DCC, DECO, and Block DECO models based on the data from 2018 to 2019, they found that the INE futures provided superior hedging and portfolio diversification results versus WTI, but inferior results versus Brent.

Reference: Lv, F., Yang, C., & Fang, L. (2020). Do the crude oil futures of the Shanghai International Energy Exchange improve asset allocation of Chinese petrochemical-related stocks? International Review of Financial Analysis, 71, 101537-. https://doi.org/10.1016/j.irfa.2020.101537

Yi, Yang, and Li (2021) investigated whether the macroeconomic uncertainty factors can explain and forecast the INE crude oil futures market’s volatility for the period from March 2018 to June 2020. The authors used the GARCH-MIDAS model to address the differences in data frequency and found that among the major oil consumers (the United States, China, and Japan) and the major oil exporters (the United Kingdom, Canada, and Russia), the geopolitical risk, economic policy uncertainty, and pandemics situation in the United Kingdom and Japan had greater predictive power for the volatility of the INE crude futures.

Reference: Yi, A., Yang, M., & Li, Y. (2021). Macroeconomic Uncertainty and Crude Oil Futures Volatility-Evidence from China Crude Oil Futures Market. Frontiers in Environmental Science, 9. https://doi.org/10.3389/fenvs.2021.636903

Disclaimer: The papers cited above represent the personal views of their authors only. They are solely provided for reference use and do not represent the views of INE. INE is not legally liable for any copyright issues that may arise from these papers.

2021 Figures of Shanghai Crude Oil Futures

Table 1: Market Price									
Open	Highest	Lowest	Close	30-Day Volatility (%)			Basis (¥/barrel)		
				Highest	Lowest	Average	Highest	Lowest	Average
302.9	546.7	301.6	499.0	8.92	3.64	5.98	32.81	-51.16	-18.91

Table 2: Trading							
Trading						Open Interest	
Cumulative Trading volume (1,000 lots)	Cumulative turnover (¥tn)	Average daily volume (1,000 lots)	Average daily turnover (¥mn)	Highest daily volume (1,000 lots)	Daytime session share (%)	Average daily open interest (1,000 lots)	Highest daily open interest (1,000 lots)
42,645.2	18.50	175	76,115	397.3	37.53	75	108.3

Table 3: Delivery								
Cumulative delivery quantity (1,000 bbl)	Cumulative delivery amount (¥mn)	Most delivered contract	Highest monthly delivery quantity (1,000 bbl)	Most delivered oil stream	Delivery volume of most delivered oil stream (1,000 bbl)	Most active delivery depot	Delivery volume of most active delivery depot (1,000 bbl)	EFP volume (1,000 bbl)
21,636	9,220	SC2106	5,005	Basrah Light	15,511	Sinochem Hongrun	8,110	4,445

03

Crude Oil Futures Awards

原油期货获奖名单

上海国际能源交易中心优秀分析师

优秀产业服务团队奖

方正中期期货投资咨询部石油化工团队

国投安信期货能源组

申万期货能源团队

国泰君安期货产业服务研究所能源服务研发团队

光大期货能源研究团队

优秀分析师奖

中信建投 李彦杰	格林大华 王　凯
申万期货 董　超	华泰期货 潘　翔
国投安信 高明宇	东证期货 安紫薇
海通期货 杨　安	宏源期货 詹建平
光大期货 钟美燕	广州期货 马　琛

2021年原油期货
交易量排名前二十会员名单

华泰期货有限公司	徽商期货有限公司
中信期货有限公司	兴证期货有限公司
东证期货有限公司	新湖期货股份有限公司
国信期货有限责任公司	浙商期货有限公司
国富期货有限公司	国投安信有限公司
国泰君安有限公司	方正中期期货有限公司
鲁证期货股份有限公司	光大期货有限公司
海通期货股份有限公司	永安期货股份有限公司
银河期货有限公司	申银万国期货有限公司
华闻期货有限公司	宏源期货有限公司

2021年原油期货
交易量排名前二十境外中介机构名单

亮点国际期货有限公司

STRAITS FINANCIAL SERVICES PTE LTD

J.P. Morgan Securities plc

Orient Futures International (Singapore) Pte. Ltd.

DBS Bank Ltd.

Societe Generale International Limited

中国新永安期货有限公司

Goldman Sachs International

ABN AMRO Clearing Bank N.V.

磐石金融有限公司

横华国际期货有限公司

HGNH INTERNATIONAL FINANCIAL (SINGAPORE) PTE. LTD.

群益期货(香港)有限公司

元大期货(香港)有限公司

中一期货有限公司

Phillip Futures Pte Ltd

KGI SECURITIES (SINGAPORE) PTE. LTD.

直达国际金融服务有限公司

ADMIS Singapore Pte. Limited

广发期货（香港）有限公司

Outstanding Analysts

Outstanding Industry Service Team Award

Petrochemical Team of Investment Consulting Department, Founder CIFCO Futures

Energy Division, SDIC Essence Futures

Energy Team, ShenYin & WanGuo Futures

Energy Service R&D Team, Guotai Junan Futures Industry Service Research Institute

Energy Research Team, Everbright Futures

Outstanding Analyst Award

China Securities Futures (Li Yanjie)

Shenwan Futures (Dong Chao)

SDIC Essence Futures (Gao Mingyu)

Haitong Futures (Yang An)

Everbright Futures (Zhong Meiyan)

Gelin Dahua Futures (Wang Kai)

Huatai Futures (Pan Xiang)

Orient Futures (An Ziwei)

Hongyuan Futures (Zhan Jianping)

Guangzhou Futures (Ma Chen)

Top 20 Members in 2021 by Crude Oil Futures Trading Volume

Huatai Futures Co., Ltd.

CITIC Futures Co., Ltd.

Orient Futures Co., Ltd.

Guoxin Futures Co., Ltd.

Guofu Futures Co., Ltd.

Guotai Junan Co., Ltd.

Luzheng Futures Co., Ltd.

Haitong Futures Co., Ltd.

Galaxy Futures Co., Ltd.

Huawen Futures Co., Ltd.

Huishang Futures Co., Ltd.

Industrial Securities Futures Co., Ltd.

Xinhu Futures Co., Ltd.

Zheshang Futures Co., Ltd.

SDIC Essence Futures Co., Ltd.

Founder CIFCO Futures Co., Ltd.

Everbright Futures Co., Ltd.

Yong' an Futures Co., Ltd.

ShenYin & WanGuo Futures Co., Ltd.

Hongyuan Futures Co., Ltd.

Top 20 Overseas Intermediaries in 2021 by Crude Oil Futures Trading Volume

Bright Point International Futures Ltd.

Straits Financial Services Pte. Ltd.

J.P. Morgan Securities plc

Orient Futures International (Singapore) Pte. Ltd.

DBS Bank Ltd.

Société Générale International Ltd.

China Xin Yongan Futures Co., Ltd.

Goldman Sachs International

ABN AMRO Clearing Bank N.V.

BANDS Financial Ltd.

HGNH International Futures Co., Ltd.

HGNH International Financial (Singapore) Pte. Ltd.

CSC Futures (HK) Ltd.

Yuanta Futures (HK) Co., Ltd.

CN First International Futures Ltd.

Phillip Futures Pte. Ltd.

KGI Securities (Singapore) Pte. Ltd.

DA International Financial Service Ltd.

ADMIS Singapore Pte. Ltd.

GF Futures (Hong Kong) Co., Ltd.

上海期貨交易所
SHANGHAI FUTURES EXCHANGE

上海国际能源交易中心
SHANGHAI INTERNATIONAL ENERGY EXCHANGE