



美国加州碳排放交易市场介绍

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洲际交易所
2013年10月30日

ICE: 商品和衍生品市场

ICE受监管的期货交易所

美国和加拿大		欧洲
农产品和能源	FINANCIALS	能源 & 有色金属
可可 咖啡 棉花 糖 橙汁 大麦 菜籽油 玉米 小麦 大豆 北美天然气 北美电力 RINs	货币对 美元指数 Russell 股票指数 信用指数	布伦特和布伦特NX原油 WTI原油 柴油和低硫柴油 ASCI(阿格斯含硫原油) 成品油 天然气液体 液化天然气 欧洲天然气 欧洲电力 煤炭 排污权 铁矿石 航运

ICE场外交易

OTC 合约
<p>OTC 信用 – Creditex 信用违约掉期(CDS) – 指数, 独立合约, 结构性产品, 主权 CDS</p> <p>OTC 能源 – 现货能源合约</p> <p>巴西电力交易所 – 巴西电力市场</p>

ICE数据与服务

市场数据
<p>实时价格和屏幕 指数和每日收市报告 每笔数据、时间和交易量 市场价格和有效期 远期曲线</p>
服务
<p>WebICE & ICE Mobile ICE eConfirm ICE Link ICE Chat ICE Match 漆咸能源 咖啡评级 ICE Trade Vault</p>

全球清算所

ICE 美国清算所, ICE加拿大清算所

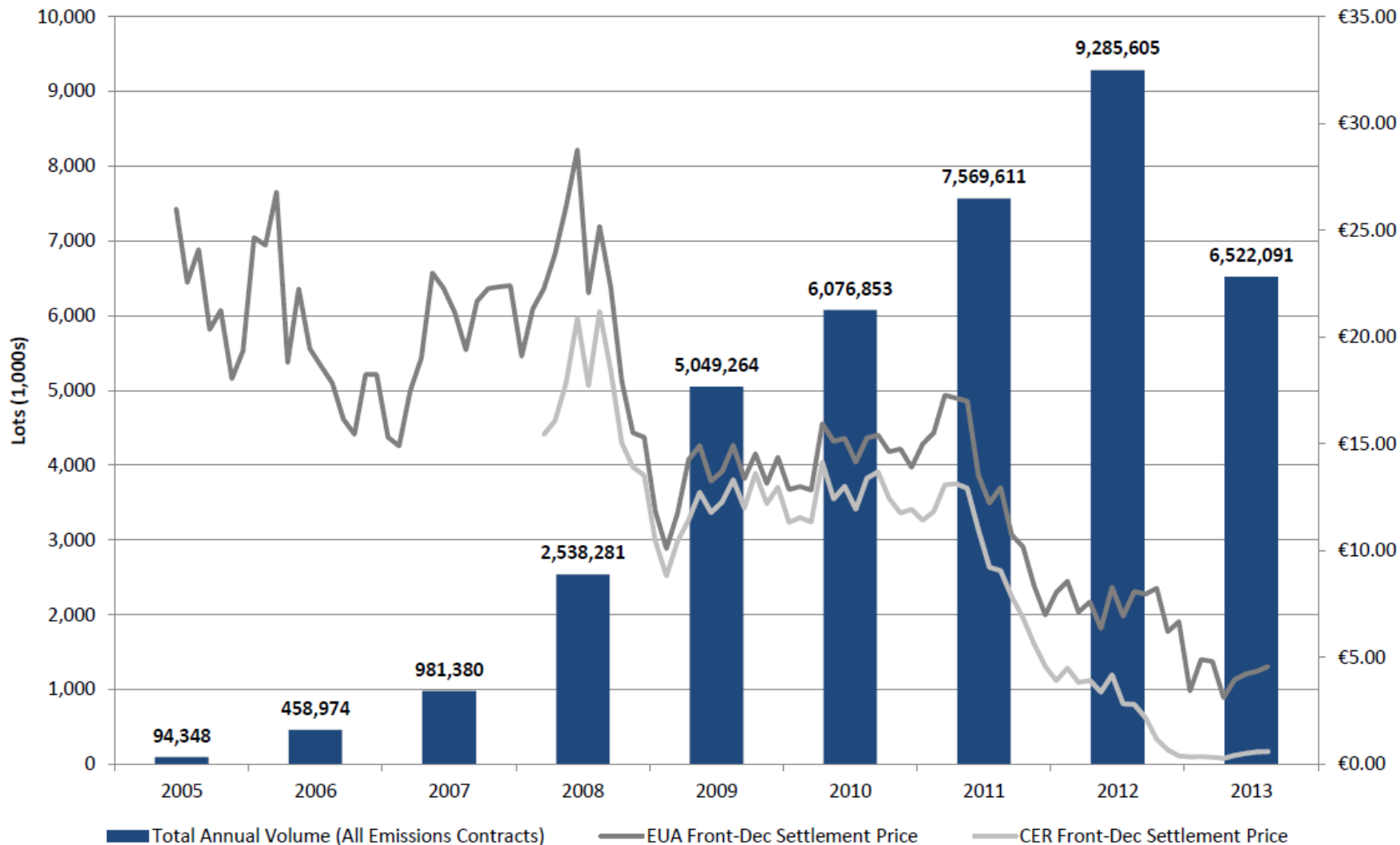
ICE欧洲清算所

ICE清算集团, ICE 信用清算

综合的市场、清算和技术

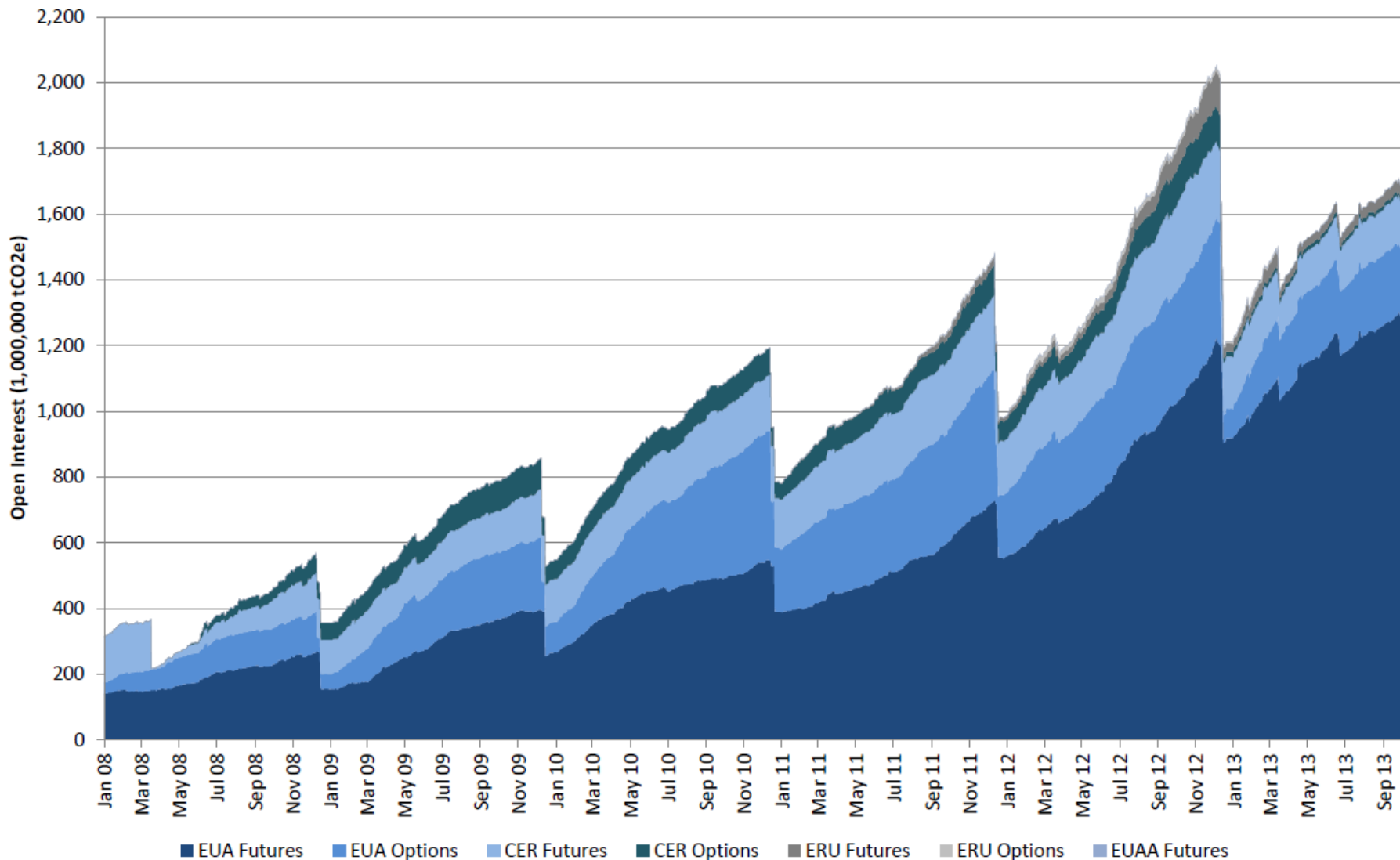
ICE欧洲碳市场

年交易量和结算价格 - 2013年9月



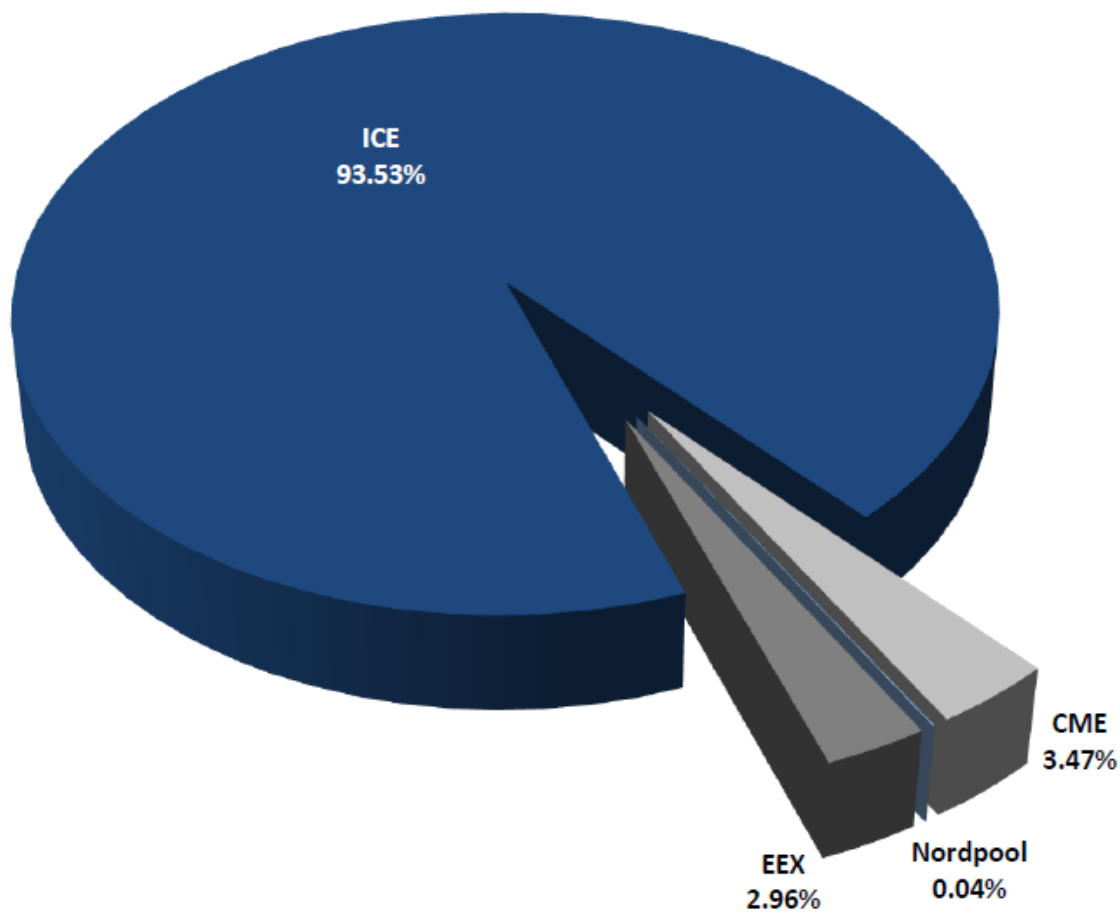
ICE欧洲碳市场

持仓总量 - 2013年9月



ICE欧洲碳市场

碳交易所（二级市场）市场份额 - 2013年9月



ICE was awarded leading Exchange in the European Carbon Market Survey in 2005, 2006, 2007, 2008, 2009, 2010, 2011 & 2012

Environmental Finance

PUBLICATIONS

BEST EXCHANGE EU ETS

BEST EXCHANGE Kyoto Project Credits (JI & CDM)

ICE Emissions Members

ABN Amro Clearing Bank N. V.
ADM Investor Services INC
ADM Investor Services International Ltd
Alpiq Swisstrade AG
Banco Santander Central Hispano SA
Barclays Capital
BG International Ltd
BNP Paribas Commodity Futures Ltd
BP Gas Marketing Ltd
Centrica Energy Ltd
CEZ A.S.
Citadel Derivatives Trading Ltd
Citadel Equity Fund Ltd
Citigroup Global Markets Ltd
Consus France S.A.R.L.
Credit Agricole Corporate & Investment Bank
Credit Suisse Securities (Europe) Ltd
Credit Suisse Securities (USA) LLC
Deutsche Bank AG
Deutsche Bank AG BHF
E.On Energy Trading SE
E&T Energie Handelsellschaft M. B. H.
EDF Trading Ltd
EDP – Energias de Portugal SA
EGL AG
EGL Energia Iberia SL
Electrabel SA
Endesa Generacion SA
Energia-Obrót SA
Energie AG Oberosterreich Trading GmbH
European Investment Bank
FCStone, LLC
First New York Securities LLC
Five Rings Capital, LLC
Fortum Power and Heat OY
Galp Power SA
Gazprom Marketing & Trading Ltd
Gazprom M&T – Singapore Pte Ltd
GFI Securities Ltd
GH Financials Ltd
Goldman Sachs International
HSBC Bank PLC
ICAP Corporates LLC
ICAP Securities Ltd
Infinium Capital Management LLC
Jaypee International Inc
Jefferies Bache Ltd
Jefferies Bache LLC
JP Morgan Securities Ltd
Jump Trading LLC
KFW Bankengruppe
Knight Capital Americas LLC
Macquarie Bank Limited (London Branch)
Macquarie Futures USA LLC
Marex Financial Ltd
Marubeni Corporation
Merrill Lynch Commodities (Europe) Ltd
Merrill Lynch International
Merrill Lynch, Pierce, Fenner & Smith Inc
Mitsui & Co.
Mizuho Securities USA Inc
Morgan Stanley & Co International Ltd
Natixis Commodity Markets Ltd
Newedge UK Financial Ltd
Newedge USA LLC
Nomura International PLC
Nordea Bank Finland
Optiver VOF
Orbeo Climate Change
OTC Europe LLP
Penson GHCO
PetroChina International (London) Company Ltd
Proxima Clearing LLC
Public Power Corporation S. A.
R.J. O'Brien & Associates LLC
Rand Financial Services Inc
RBC Capital Markets LLC
RBC Europe Ltd
REN Trading SA
RWE Supply and Trading GmbH
Sagacarbon
Scottish Power Energy Management Ltd
SEB Futures
Shell Int. Trading & Shipping Co Ltd
SmartestEnergy Ltd
Spectron Energy Services Ltd
Stadtwerke Leipzig GmbH
Statkraft Energi AS
Sunrise Brokers LLP
Susquehanna Ireland Ltd
Tauron Polska Energia Spolka Akcyjna
TFS Derivatives
The Royal Bank of Scotland PLC
ThyssenKrupp AG
Tibra Trading Europe Ltd
Total Global Steel Ltd
TRX Futures Limited
Tullett Prebon (Europe) Ltd
UBS Ltd
Vattenfall Energy Trading GmbH
Vattenfall Energy Trading Netherlands N. V.
Verbund AG
Virtu Financial Global Markets LLC
Wells Fargo Bank N. A.
XR Trading, LLC

加州碳交易市场

在ICE的期货和期权市场

› California Carbon Allowance Futures

- Physically delivered
- Units of Trading: 1,000 California Carbon Allowances
- Minimum Price Flux: \$0.01 per California Carbon Allowance = \$10.00 per contract
- Contract Series
 - Standard-cycle contract listings: Monthly contract sets for the current year + 3 years.
 - Annual December contract sets through 2020
 - The Exchange may list any other calendar month contract sets off the standard-cycle listing schedule through the last expiring contract set.

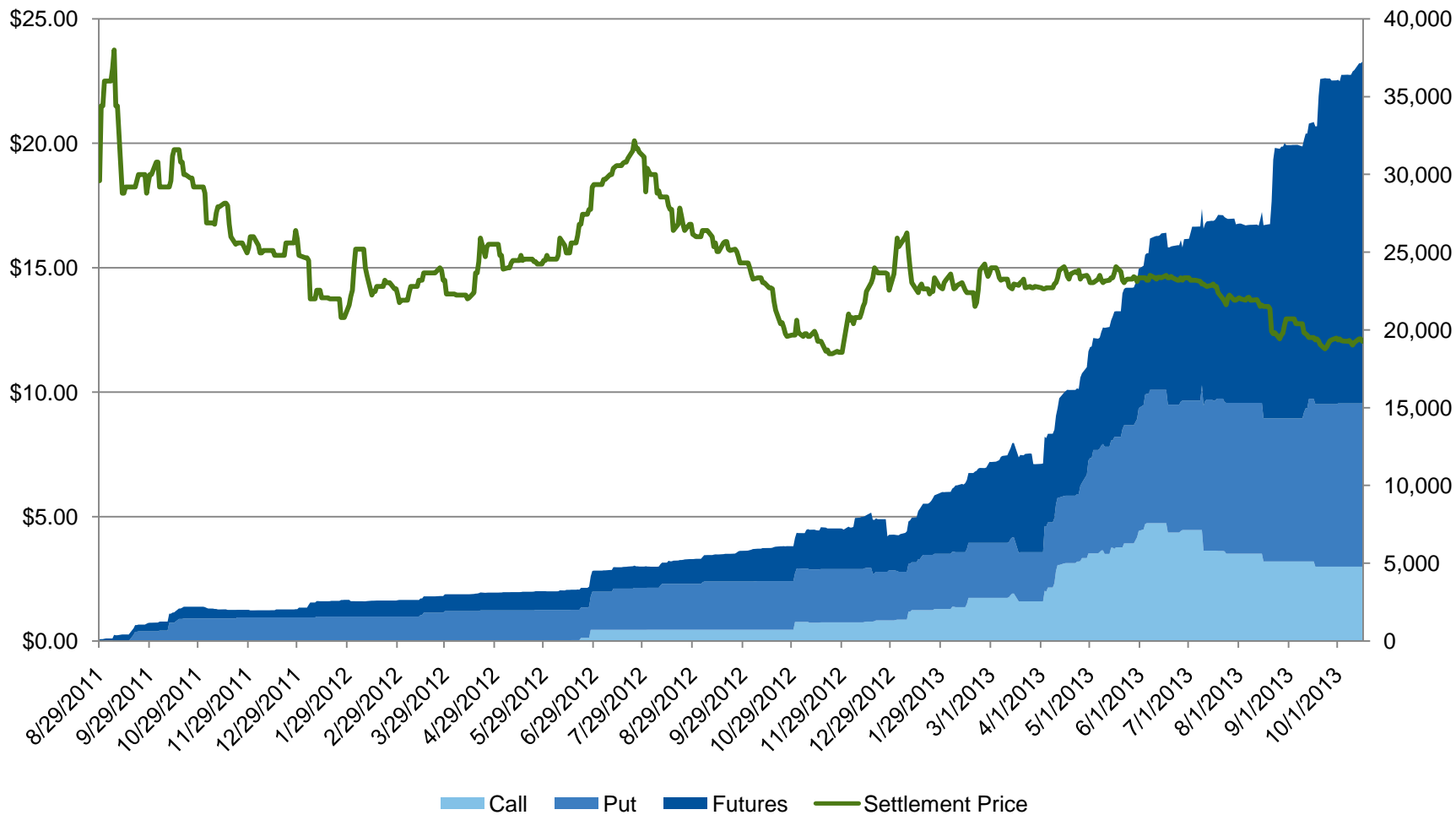
› California Carbon Allowance Options

- Calls and Puts
- European style
- Contract Size 1 lot = 1 California Carbon Allowance Forward Contract

加州碳交易市场

持仓总量和价格 - 期货和期权

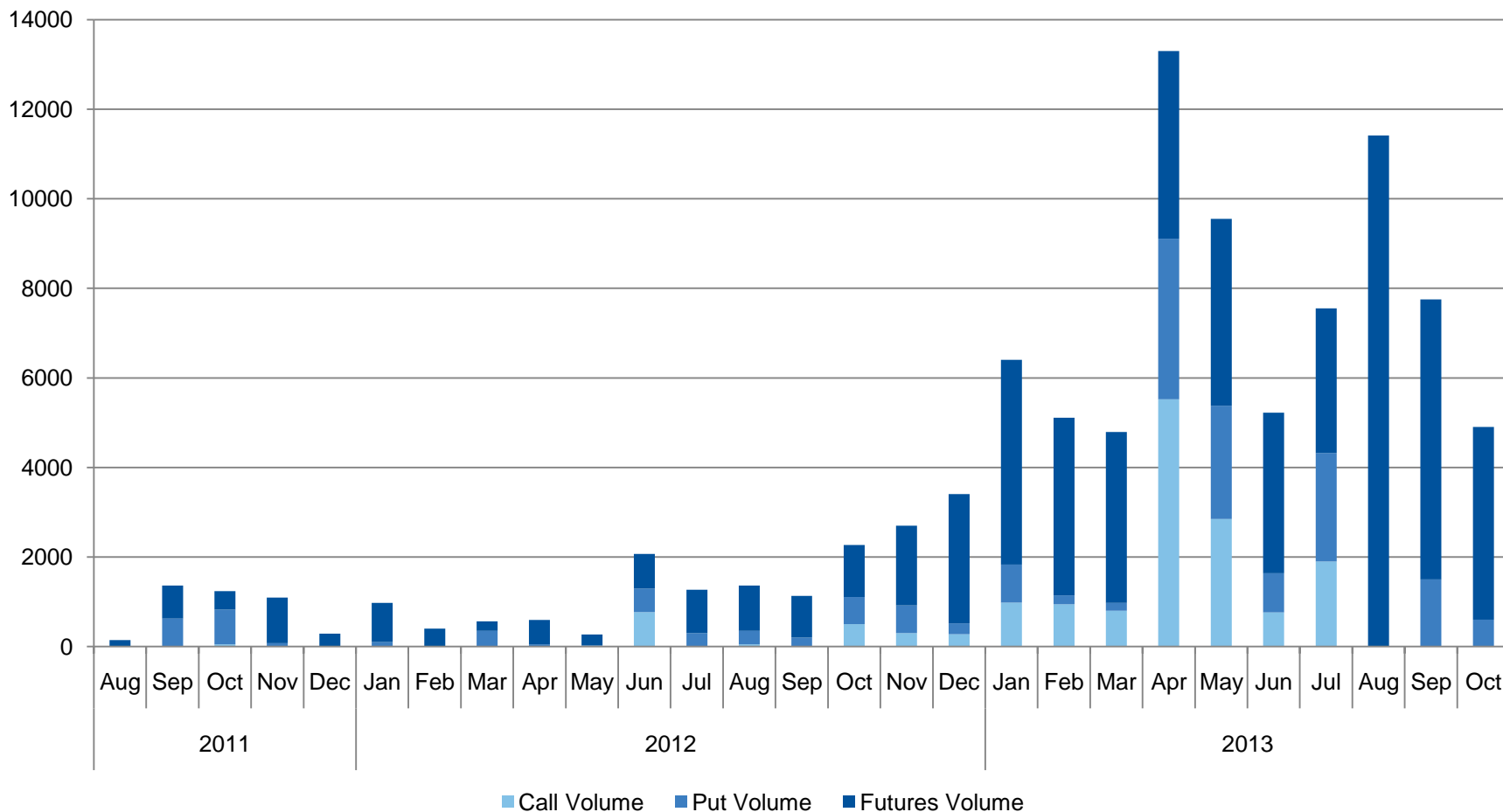
California Carbon Allowance Open Interest and Settlement Price (by Oct 16, 2013)



加州碳交易市场

交易量 - 期货和期权

California Carbon Allowance Trading Volume (By Oct 17, 2013)



案例说明：发电厂的风险管理

- › Futures: an efficient way to manage emission risks and cash flows
- › A power plant sells a 480,000 MWh block of energy to be delivered and paid equally through out the year @ \$50/MWh
- › The generation of power has an associated emission liability of 240,000* tons of CO₂
- › The power plant needs to hold allowances for compliance in Jan 2014
- › The power plant is unsure about price movement and is concerned that allowances will become more costly than at the time the deal was struck.

Option I	Wait and buy allowances at the compliance deadline (i.e. Jan 2014)
Option II	Buy 240,000 allowances at the time the deal is made, and hold them for compliance
Option III	Buy 240,000 allowances on ICE via 240 lots of ICE CCA Futures with a Dec 30, 2013 delivery date

* Assumes 0.5 Mt CO₂/MWh

案例说明：发电厂的风险管理

- › The current spot market price for carbon allowances is \$15.00
- › The current futures market price for December delivery is \$15.20
- › \$7.50/MWh is the power revenues allocated to carbon allowances ($0.5 \text{ Mt CO}_2/\text{MWh} \times \15.00)

Scenario 1: Allowance price is \$17.00 on Dec 31 2013

	Cost of Compliance	Initial Cash Layout
Option I: Buy on Dec-31-2013	$\$17.00 \times 240,000 = \$4,080,000$	0
Option II: Buy Immediately	$\$15.00 \times 240,000 = \$3,600,000$	\$3,600,000
Option III: Futures Market	$\$15.20 \times 240,000 = \$3,648,000$	\$420,000 ¹

Scenario 1: Cash inflows & outflows allocated to carbon allowances (in thousands)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash Inflow ²	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
Outflow Opt. I	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$4,080)
Cumulative	\$300	\$600	\$900	\$1,200	\$1,500	\$1,800	\$2,100	\$2,400	\$2,700	\$3,000	\$3,300	(\$480)
Outflow Opt. II	(\$3,600)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative	(\$3,300)	(\$3,000)	(\$2,700)	(\$2,400)	(\$2,100)	(\$1,800)	(\$1,500)	(\$1,200)	(\$900)	(\$600)	(\$300)	\$0
Outflow Opt. III³	(\$420)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$3,228)
Cumulative	(\$120)	\$180	\$480	\$780	\$1,500	\$1,080	\$1,380	\$1,680	\$1,980	\$2,280	\$2,880	(\$48)

1. The initial margin of 240 lots of ICE California Carbon Futures Vintage 2013
2. Monthly cash inflow allocated to carbon allowances = $\$7.50 \times 40,000 \text{ MWh} = \$300,000$
3. This is a simplified example that assumes a step change in the futures price at the delivery, therefore variation margin is ignored

案例说明：发电厂的风险管理

Scenario 2: Allowance price is \$13.00 on Dec 31 2013

	Cost of Compliance	Initial Cash Layout
Option I: Buy on Dec-31-2013	$\$13.00 \times 240,000 = \$ 3,120,000$	0
Option II: Buy Immediately	$\$15.00 \times 240,000 = \$ 3,600,000$	\$3,600,000
Option III: Futures Market	$\$15.20 \times 240,000 = \$ 3,648,000$	\$420,000 ¹

Scenario 2: Cash inflows & outflows allocated to carbon allowances (in thousands)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash Inflow ²	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
Outflow Opt. I	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$3,120)
Cumulative	\$300	\$600	\$900	\$1,200	\$1,500	\$1,800	\$2,100	\$2,400	\$2,700	\$3,000	\$3,300	\$480
Outflow Opt. II	(\$3,600)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Cumulative	(\$3,300)	(\$3,000)	(\$2,700)	(\$2,400)	(\$2,100)	(\$1,800)	(\$1,500)	(\$1,200)	(\$900)	(\$600)	(\$300)	\$0
Outflow Opt. III³	(\$420)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$3,228)
Cumulative	(\$120)	\$180	\$480	\$780	\$1,500	\$1,080	\$1,380	\$1,680	\$1,980	\$2,280	\$2,880	(\$48)

1. The initial margin of 240 lots of ICE California Carbon Futures Vintage 2013
2. Monthly cash inflow allocated to carbon allowances = $\$7.50 \times 40,000 \text{ MWh} = \$300,000$
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Further benefits by enjoying margin credit when the power plant hedging with power contracts on ICE

加州温室气体许可权第一次拍卖

2012年11月14日拍卖

› GHG Allowances Offered for Sale in the November 2012 Auction

Auction	Number of GHG Allowances
Current Auction (2013 vintage)	23,126,110
Advance Auction (2015 vintage)	39,450,000

- The number of allowances listed for the Current Auction is a minimum number and may increase as a result of additional consignments of allowances.

› Administrative Requirements

- Eligibility: California covered entities, opt-in covered entities, and voluntarily associated entities
- Entities must have CITSS account*

*Compliance Instrument Tracking System Service (CITSS)

加州温室气体许可权第一次拍卖结果

2012年11月14日拍卖

Current Auction of 2013 Vintage Allowances

- › Total 2013 Allowances Sold at Auction: 23,126,110 (23,126,110 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$10.09 (Auction Reserve Price: \$10.00)
- › Allowances Purchased by Compliance Entities: 97.0%
- › Maximum Price: \$91.13, Minimum Price: \$10.00, Mean Price: \$13.75, Median Price: \$12.96
- › Herfindahl–Hirschman Index: 1133 (indicating moderate concentrated)

Advance Auction of 2015 Vintage Allowances

- › Total 2015 Allowances Sold at Auction: 5,576,000 (39,450,000 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$10.00 (Auction Reserve Price: \$10.00)
- › Allowances Purchased by Compliance Entities: 91.0%
- › Maximum Price: \$17.25, Minimum Price: \$10.00, Mean Price: \$11.07, Median Price: \$10.59
- › Herfindahl–Hirschman Index: 1485 (indicating moderate concentrated)

加州温室气体许可权第二次拍卖结果

2013年2月拍卖

Current Auction of 2013 Vintage Allowances

- › Total 2013 Allowances Sold at Auction: 12,924,822 (12,924,822 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$13.62 (Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 88.15%
- › Maximum Price: \$50.01, Minimum Price: \$10.71, Mean Price: \$14.71, Median Price: \$12.96
- › Herfindahl–Hirschman Index: 728 (indicating competitive)

Advance Auction of 2016 Vintage Allowances

- › Total 2015 Allowances Sold at Auction: 4,440,000 (9,560,000 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$10.71 (Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 100%
- › Maximum Price: \$40.00, Minimum Price: \$10.70, Mean Price: \$12.40, Median Price: \$11.12
- › Herfindahl–Hirschman Index: 3159 (Highly concentrated)

加州温室气体许可权第三次拍卖结果

2013年5月拍卖

Current Auction of 2013 Vintage Allowances

- › Total 2013 Allowances Sold at Auction: 14,522,048 (14,522,048 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$14.00 (**record high price**, Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 90.22%
- › Maximum Price: \$50.01, Minimum Price: \$10.71, Mean Price: \$16.67, Median Bid Price: \$13.49, Median Allowance Price: \$14.25
- › Herfindahl–Hirschman Index: 609 (indicating competitive)

Advance Auction of 2016 Vintage Allowances

- › Total 2015 Allowances Sold at Auction: 7,515,000 (9,560,000 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$10.71 (Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 86.49%
- › Maximum Price: \$35.00, Minimum Price: \$10.71, Mean Price: \$12.19, Median Bid Price: \$11.19, Median Allowance Price: \$11.02
- › Herfindahl–Hirschman Index: 1198 (Moderately concentrated)

加州温室气体许可权第四次拍卖结果

2013年8月拍卖

Current Auction of 2013 Vintage Allowances

- › Total 2013 Allowances Sold at Auction: 13,865,422 (13,865,422 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$12.22 (Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 95.5%
- › Maximum Price: \$50.01, Minimum Price: \$10.71, Mean Price: \$15.35, Median Bid Price: \$12.62, Median Allowance Price: \$13.01
- › Herfindahl–Hirschman Index: 861 (indicating competitive)

Advance Auction of 2016 Vintage Allowances

- › Total 2015 Allowances Sold at Auction: 9,560,000 (9,560,000 Allowances Available for Sale)
- › Settlement Price Per Allowance: \$11.10 (Auction Reserve Price: \$10.71)
- › Allowances Purchased by Compliance Entities: 96.3%
- › Maximum Price: \$30.00, Minimum Price: \$10.71, Mean Price: \$11.78, Median Bid Price: \$10.95, Median Allowance Price: \$11.10
- › Herfindahl–Hirschman Index: 1605 (Moderately concentrated)

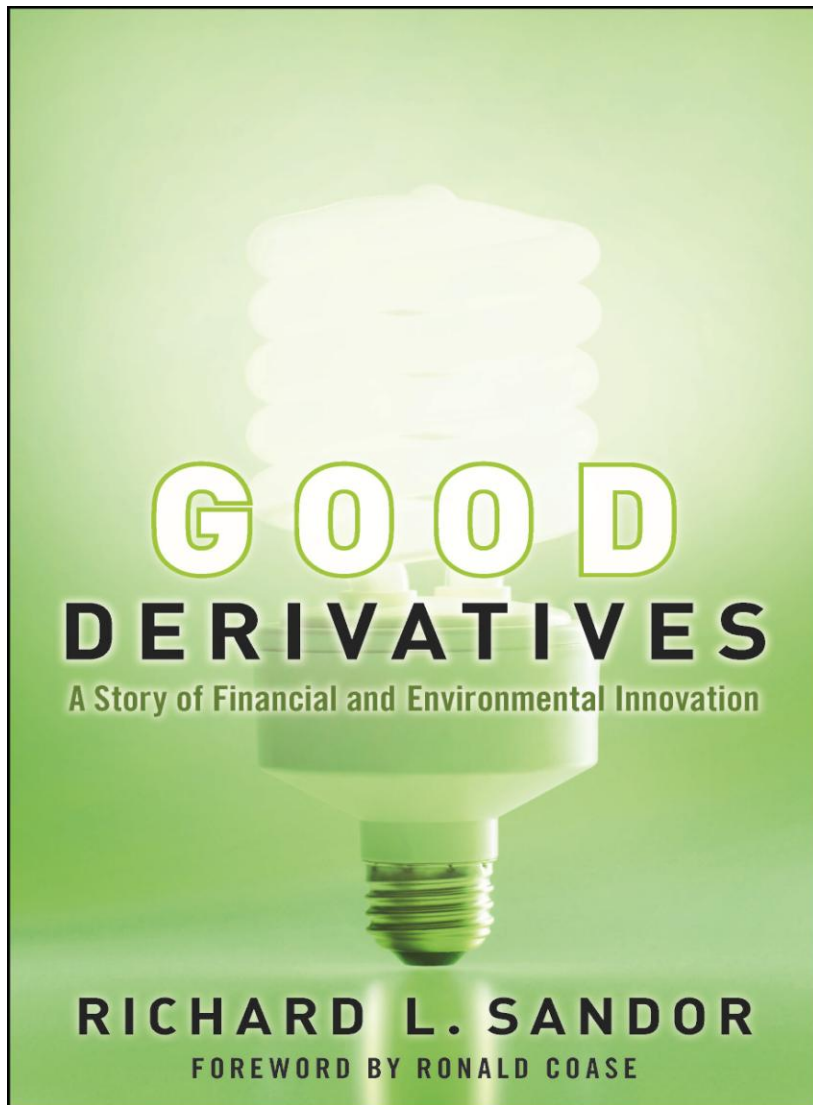
中国碳市场未来猜想

- › 上海碳市场 – 上海自贸区可以扮演的角色？
- › 深圳碳市场 – 前海深港现代服务业合作区？

中国人民银行副行长易纲

- › 通过在碳排放配置限额下进行的碳交易,市场可大大提高效率,减少整个社会的减排成本,而金融机构在碳交易中将起到非常重要的作用。不论欧洲还是芝加哥的碳交易所,银行、基金管理公司、金融机构,都是参与碳交易的主要机构、做市商,也是价格发现者,金融机构在碳交易中扮演着重要的角色。

—— 2010年9月10日



“The creation of new markets is frequently complicated and sometimes even thwarted by ideological enmity, political resistance, fear of uncertainty, or mere ignorance.”

-Ronald H. Coase
From Forward to *Good Derivatives*

Jeff Huang

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