



The nickel market – playing field of speculators or driven by fundamentals?

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How speculation
impacts the price of nickel

A study by
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University Ulm/
Center of Commodities
on behalf of
Oryx Stainless



I. Parameter Nickel

II. Main trading platform– London Metal Exchange

III. Study – Models and Methods

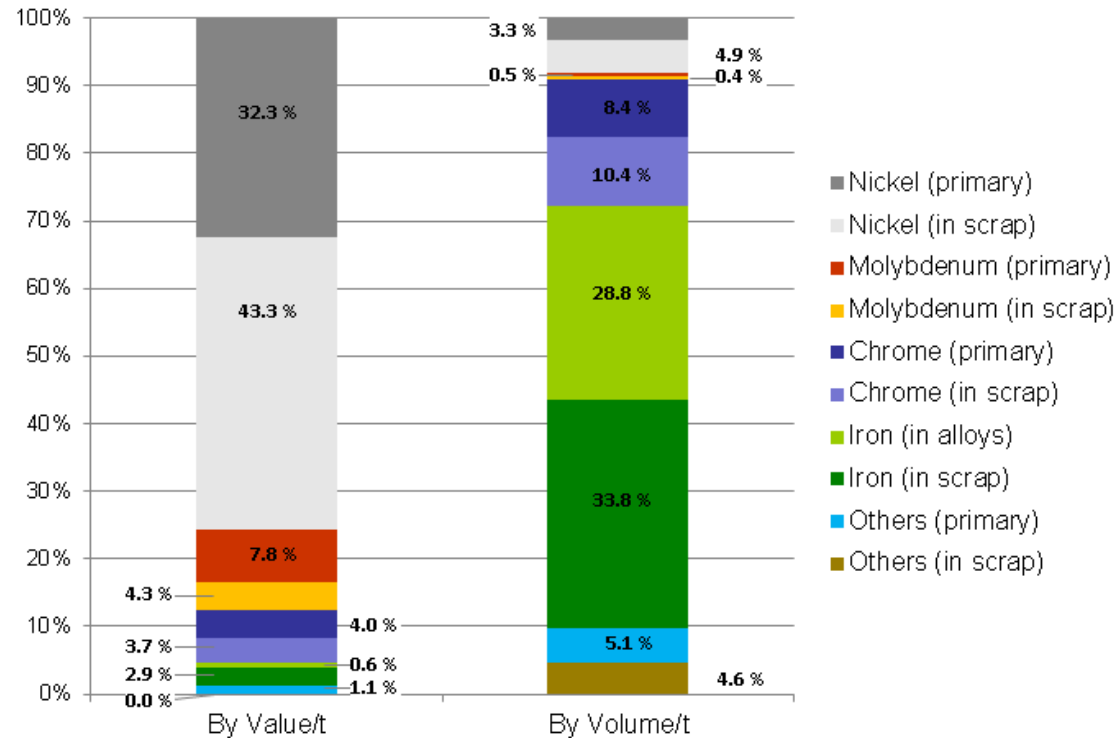
IV. Conclusion

V. Research Team

VI. About Oryx Stainless



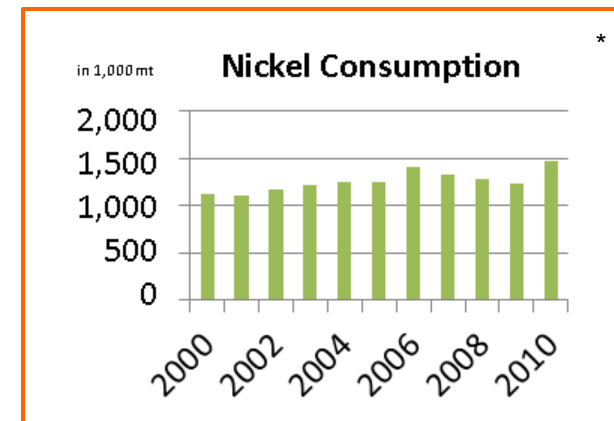
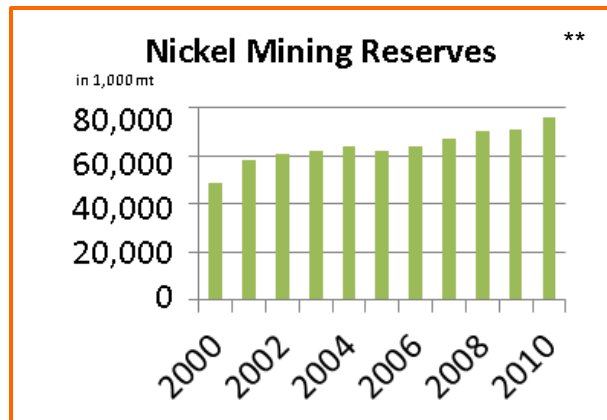
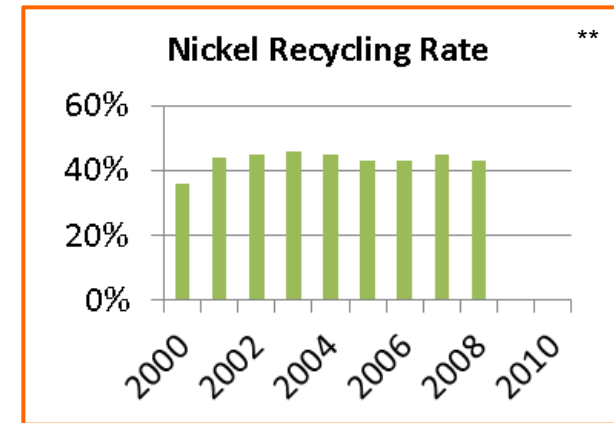
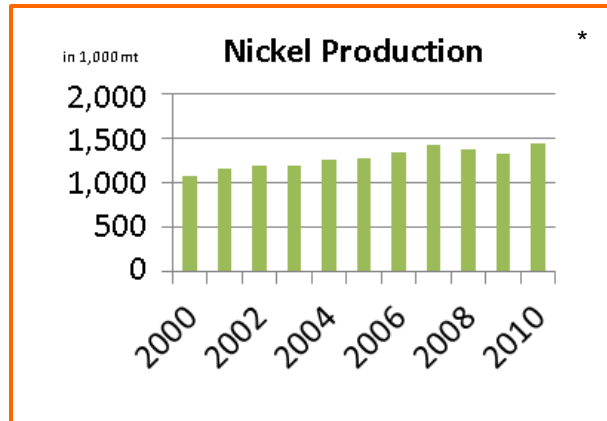
Nickel as a price factor



Nickel determines the prices for stainless steel and stainless-steel scrap

Source: Outokumpu 2007

The great importance of scrap is underestimated



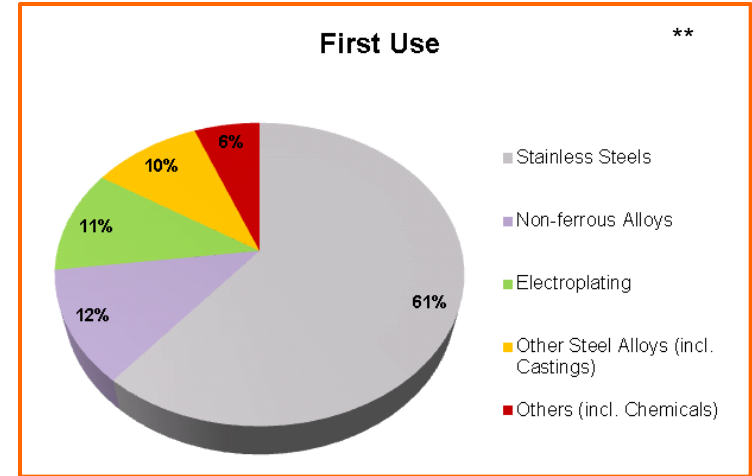
Sources:
*INSG
** US Geological Survey



World trade in nickel – price increases inevitable



- Instruments
 - Nickel Cash
 - 3-month Future
 - 15-month Future
 - 27-month Future
 - LME Nickel Option (American)
 - LME Nickel TAPOS (Traded Average Prices Options) (Asian)



- Platforms
 - Ring Trading (Open Outcry)
 - LMEselect (electronic trading)
 - Telephone trading (inter-office telephone market)

Sources:
*Reuters
** Nickel Institute

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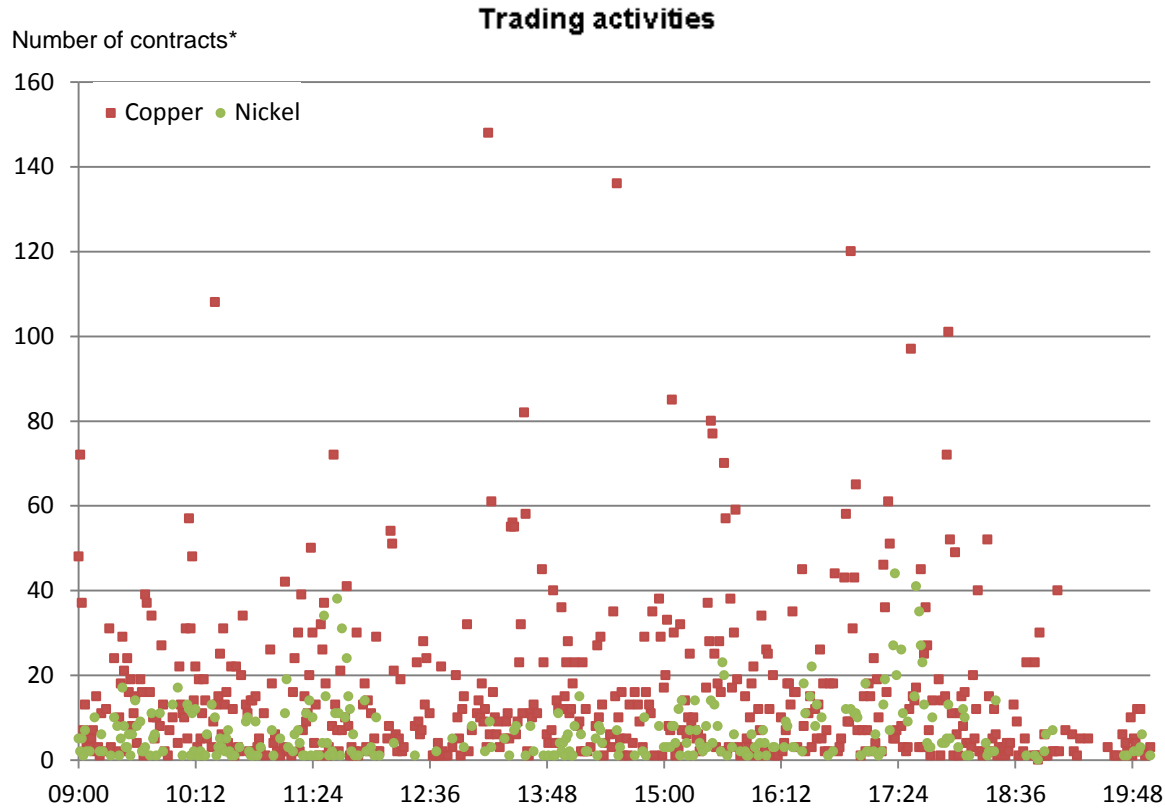
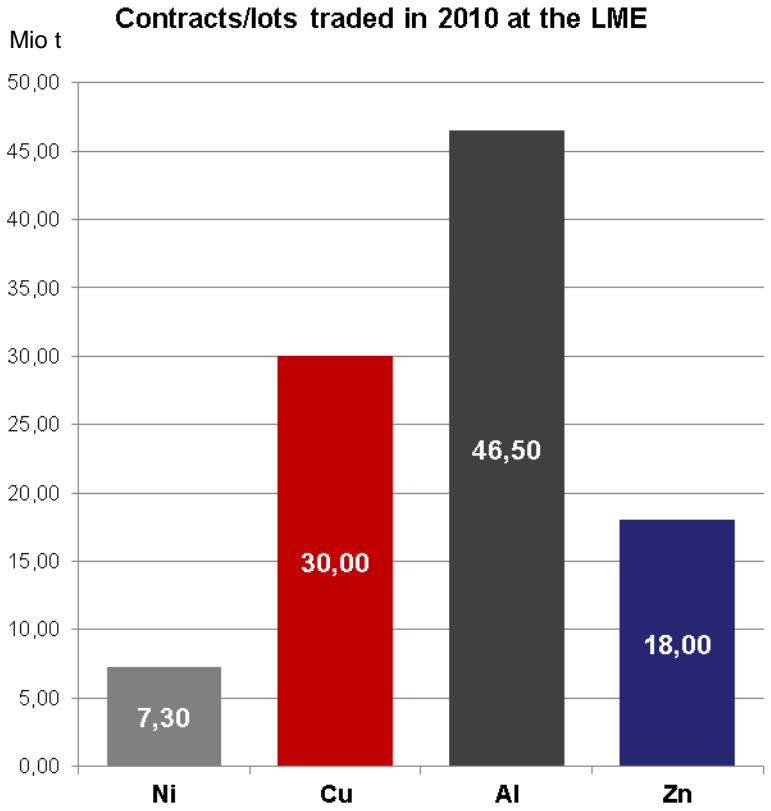
Main trading platform: London Metal Exchange



Overview

- Established over 130 years ago and based in London's City
- World's first trading place for non ferrous metals and global market place with international participants
- Transparent forum for establishing raw-materials prices months and years in advance
- Prices established at the exchange are recognised by the industry and accepted as being reliable
- Liquid market, traded contracts 2010: approx. 120.3 million (= annual turnover of 11.6 trillion USD)
- Contract features
 - Code NI
 - Ni Future introduced in 1979
 - Quality: nickel purity min. 99.80%
 - Size: 6 tonnes
 - Available as: uncut cathodes, cut cathodes, pellets, briquettes

Nickel – a market with a relative market depth



Source: Bloomberg

* Copper: 1 contract – 25 t / Nickel: 1 contract – 6 t

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Task of the study

How much are nickel prices driven by speculation?

How much do fundamental factors impact nickel prices?

- Scientific empiric study into how prices are established on the international nickel market
- Focus: how speculative investors are impacting the development of nickel prices

Special time patterns, market conditions?

What is the significance of speculation to the market participants' trading?

Method approach

Overview of models

Method approach

- Empirical study
- Fundamental factors v. non-fundamental factors
- Model of market characteristics
- Speculation, the Unexpected Price

Models

- Fundamental models
- Residual analysis
- Market model
- Micro-structure model
- Time-series model

Fundamental models

Fundamental factors impacting nickel prices

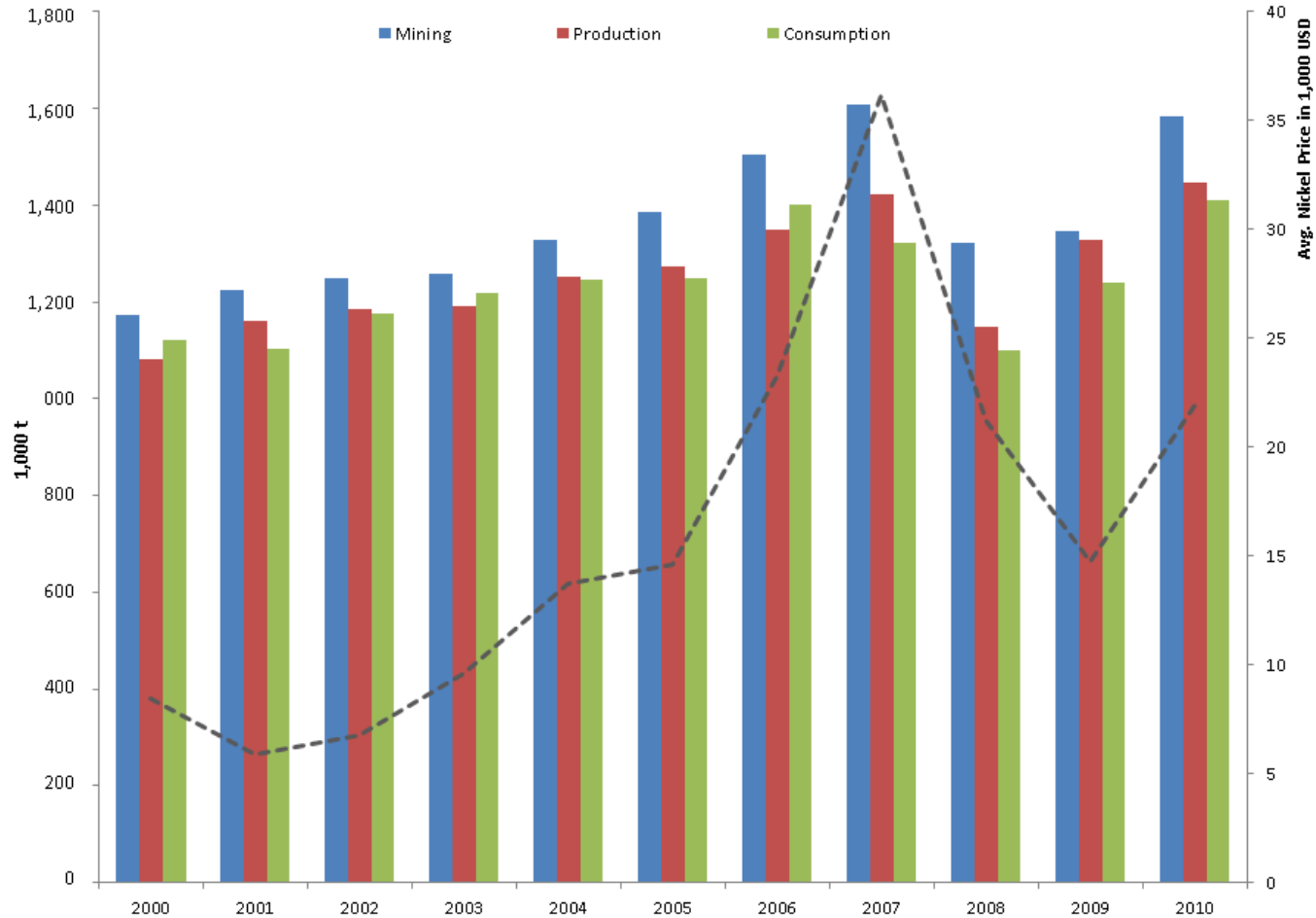
- Mining
- Production
- Consumption

Resource scrap - an influencing variable

- Up to 50% of available nickel has not been statistically captured

$$\text{Nickel Price} = \text{Mining} + \text{Production} + \text{Consumption} + \varepsilon$$

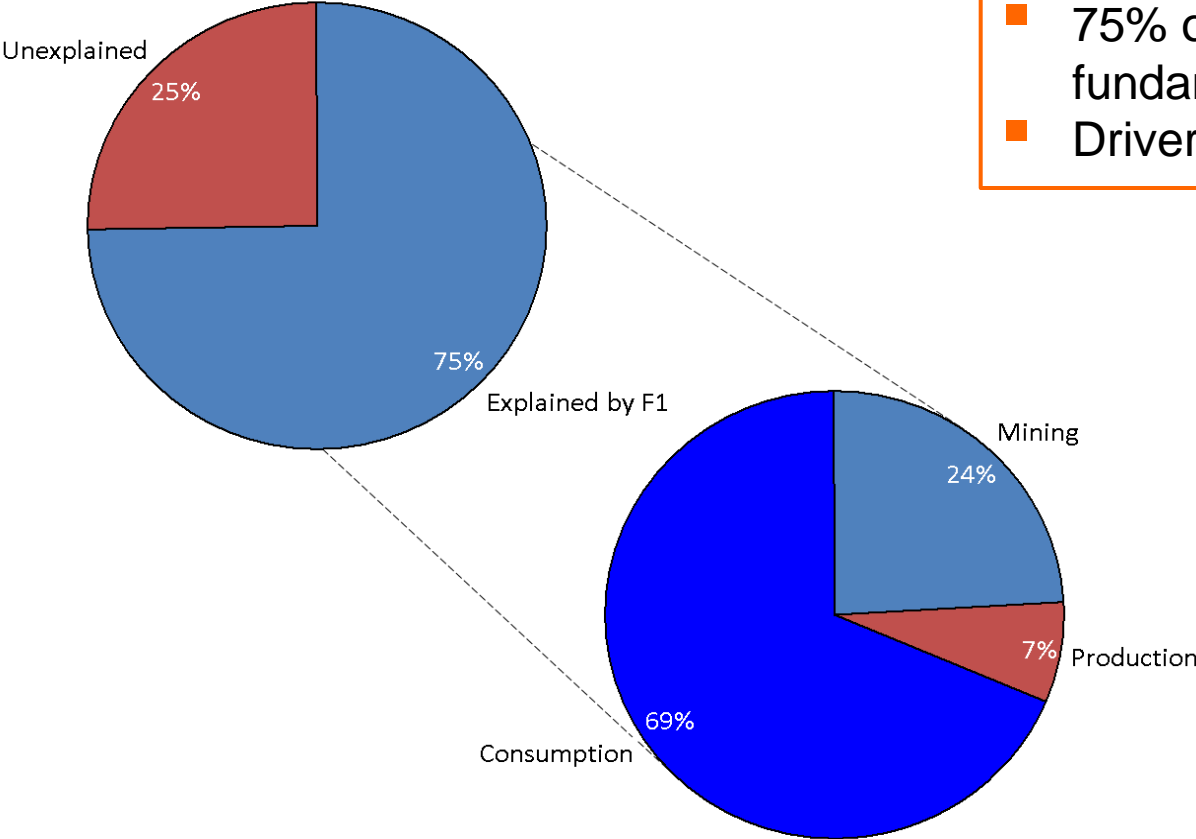
Production and demand determine the price



Source: Posch (2011): Study for Oryx Stainless



Fundamental factors primarily determine prices



- 75% of the nickel price is fundamentally determined
- Driver: consumption

Source: Posch (2011): Study for Oryx Stainless

Residual analysis

How can the non-fundamental 25% be explained?

Market information

- Nickel stocks at the LME
- Open Interest
- Volume
- Maturity date structure of Futures

Influencing factors

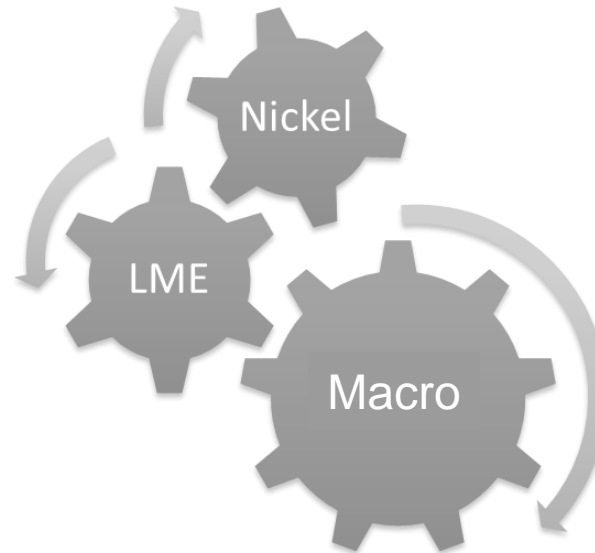
- Influencing factors vary over time. In 2008 the 15-month open interest had a price-increasing impact, but a price-reducing effect in 2009

Residual \ominus nickel price expectation
in accordance with the model \ominus exchange price

Market model

Market model

- Beside fundamental Nickel data also market information might have an impact on prices
- Analysis with market model



The nickel market is primarily influenced by fundamental factors, market information has a subordinate impact

Market effect of 25% on the part of the price not due to fundamentals

Year	Stock	Volume	Open Interest
2003	-0.236	-0.638	-3.828
2004	0.073	0.225	-0.177
2005	-0.113	-0.37	-0.555
2006	-0.486	0.558	-0.069
2007	-0.358	-1.13	0.146
2008	-0.677	-0.772	-0.165
2009	0.11	0.731	-0.238
2010	-0.02	-0.116	0.022

No consistent pattern

Source: Posch (2011): Study for Oryx Stainless



Fundamental model taking account of macro-economic factors

Examination of the results from the residual analysis on such other influencing factors as interest development, exchange-rate fluctuations and so on

	(FF1) Δ Nickel	(FF2) Residual from (F1)
EURUSD	-13586.96***	5521.20***
	(-14.52)	(5.24)
Brent	228.33***	80.21***
	(30.99)	(9.01)
3M Euribor	-1078.42***	-553.27
	(-13.47)	(-1.61)
Constant	21486.716***	22642.422
	(15.57)	(0.39)
R ²	0.78	0.07
N	730	4,478

*** 1 % Significance
 ** 5 % Significance
 * 10 % Significance

Macro-economic factors only have a subordinate impact on nickel prices

Source: Posch (2011): Study for Oryx Stainless

Market micro-structure model

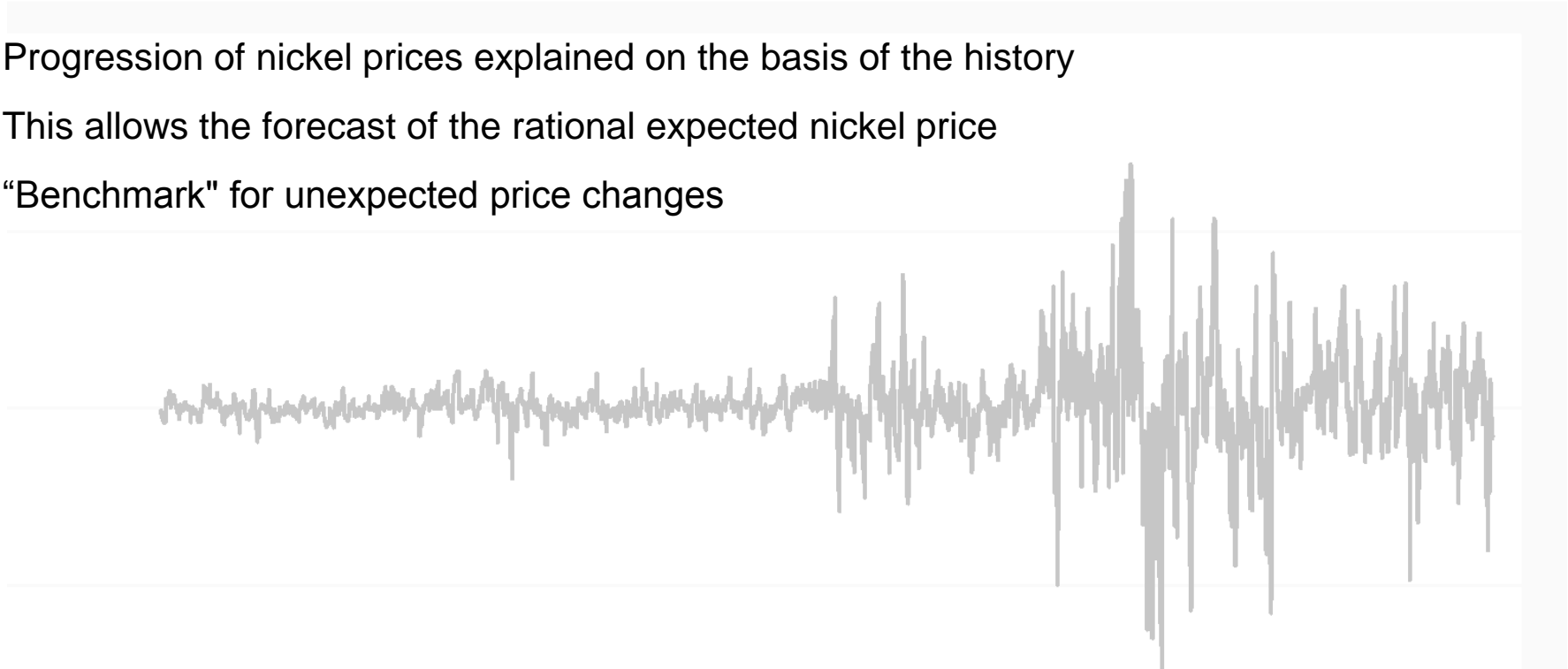
- Theoretical relationship between observed buyers and sellers in a market and the probability of trades by informed market participants
- Derivation of probability for trades by informed market participants

$$\begin{aligned} L(\theta|B, S) = & (1 - \alpha) e^{-\epsilon_b} \frac{\epsilon_b^B}{B!} e^{-\epsilon_s} \frac{\epsilon_s^S}{S!} \\ & + \alpha \delta e^{-\epsilon_b} \frac{\epsilon_b^B}{B!} e^{-(\mu + \epsilon_s)} \frac{(\mu + \epsilon_s)^S}{S!} \\ & + \alpha (1 - \delta) e^{-(\mu + \epsilon_b)} \frac{(\mu + \epsilon_b)^B}{B!} e^{-\epsilon_s} \frac{\epsilon_s^S}{S!} \end{aligned}$$

Market micro-structure model unsuitable for determining how speculation influences nickel prices due to poor stability of results

Time-series model

- Progression of nickel prices explained on the basis of the history
- This allows the forecast of the rational expected nickel price
- “Benchmark” for unexpected price changes



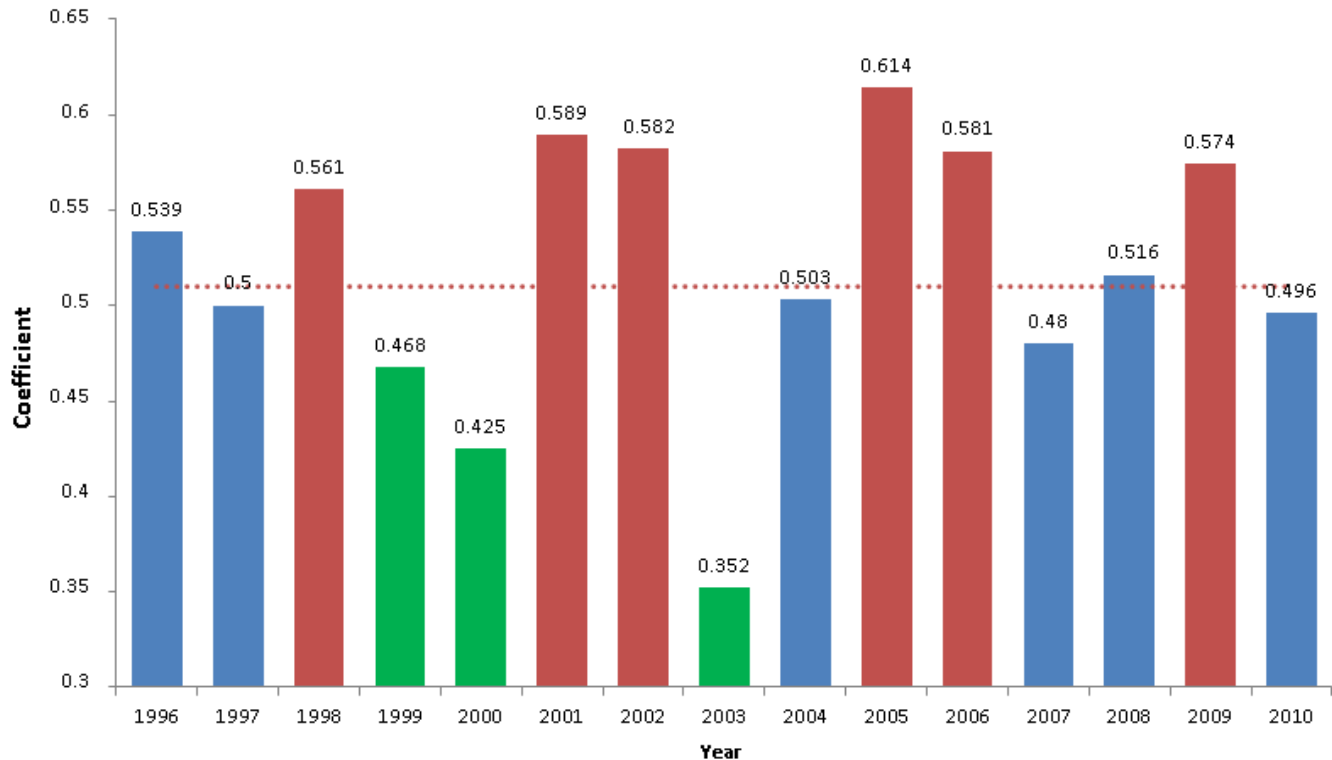
Time-series model generates the nickel price that could be rationally expected

The Unexpected Nickel Price – speculation



The difference between the Market Price and the Expected Price is the Unexpected Price

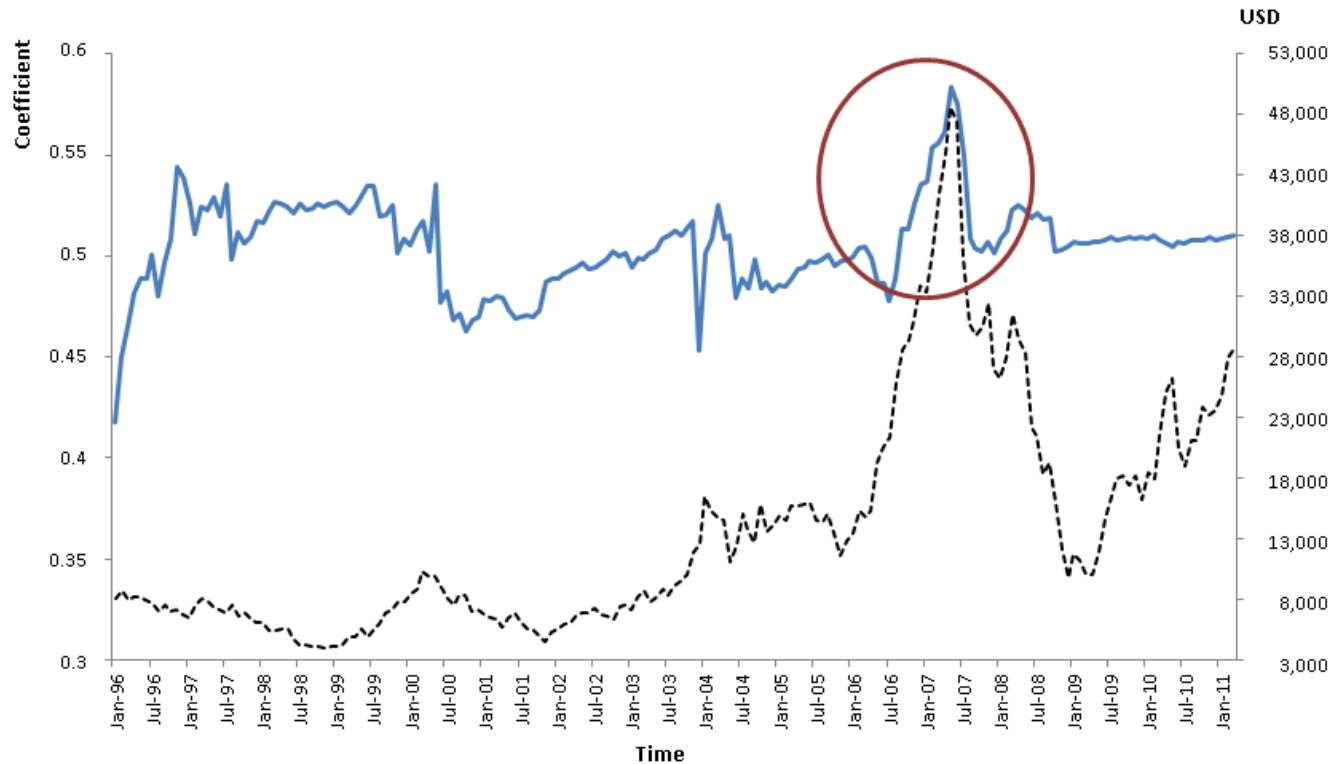
Effect of speculation over time



Speculation is a constant factor impacting nickel prices

Source: Posch (2011): Study for Oryx Stainless

Significance of speculation to nickel prices

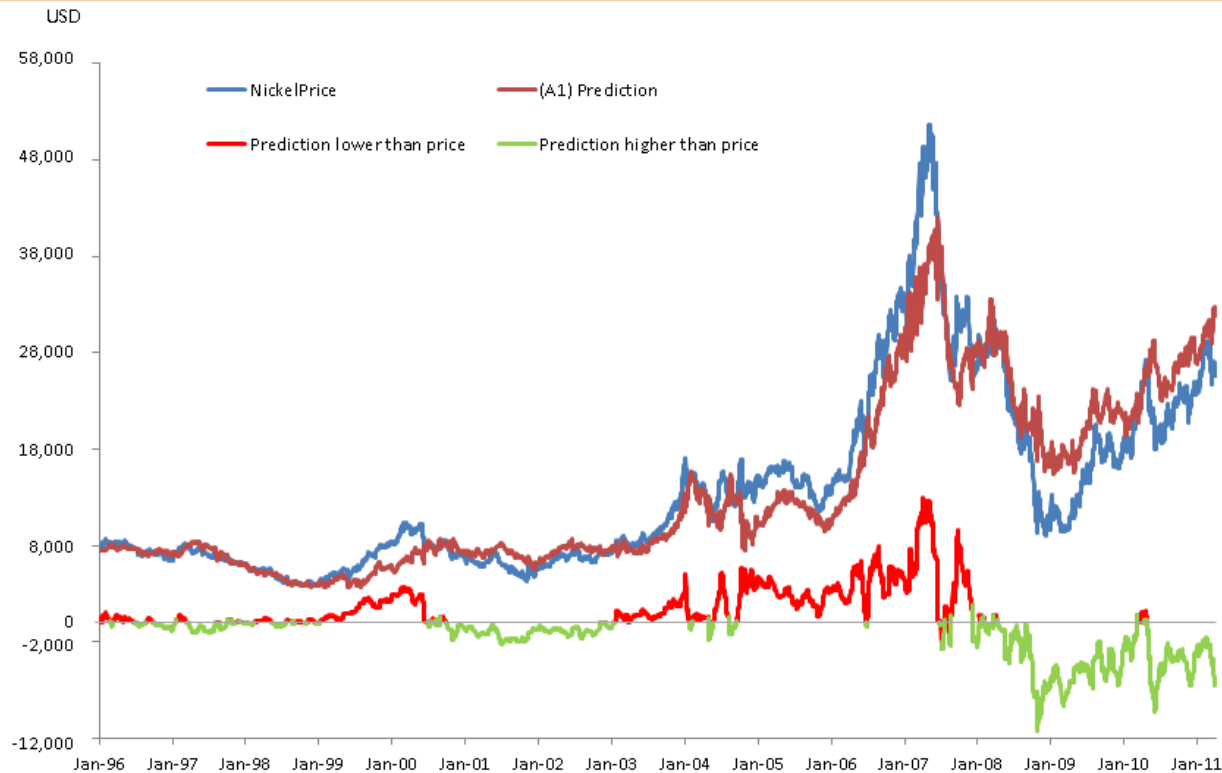


2007: Speculation drives nickel prices

Source: Posch (2011): Study for Oryx Stainless



Non-speculative price vs. market price

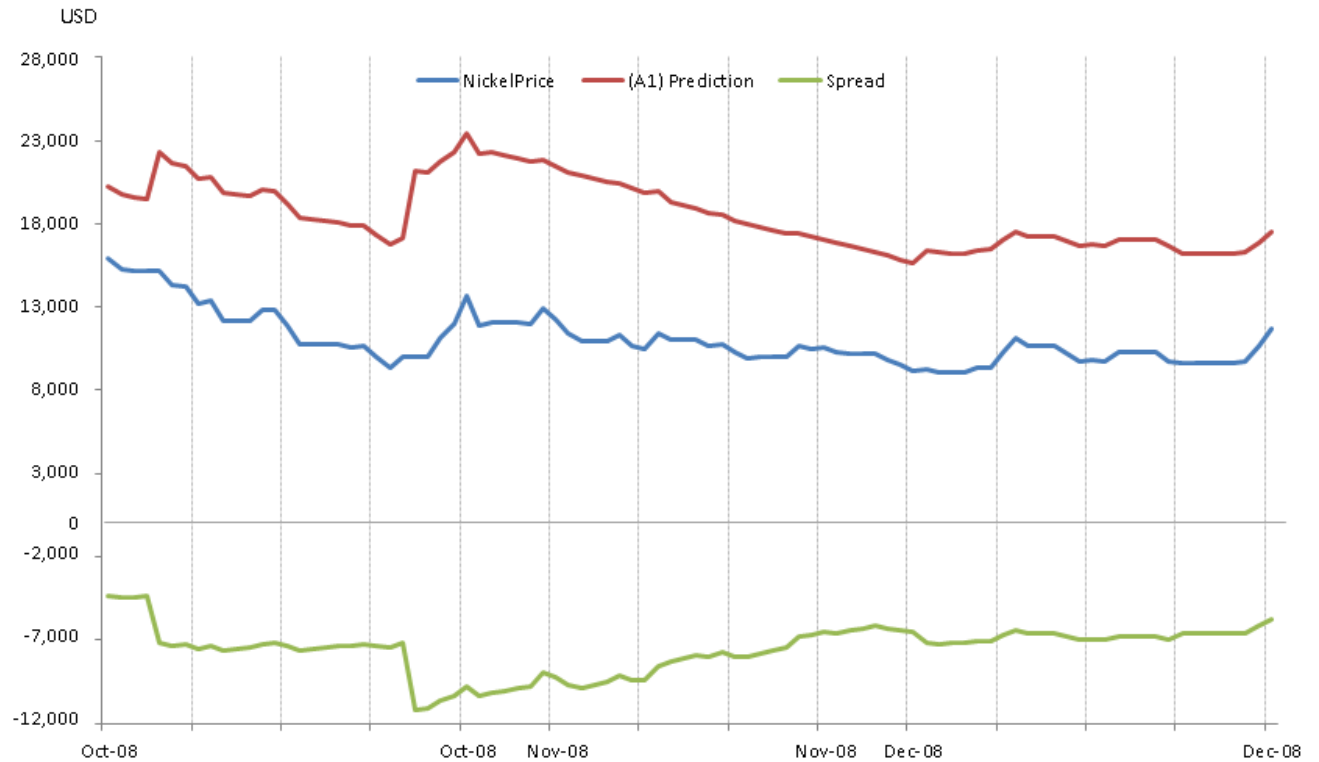


Speculation generates both positive and negative exaggerations

Source: Posch (2011): Study for Oryx Stainless



Speculation as a cost factor



Forecast models based on time series and taking account of fundamental data less volatile

Source: Posch (2011): Study for Oryx Stainless



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Nickel market – no playing field of speculators

The nickel market

- Is fundamentally driven
- Few cross-market factors
- Sufficient market depth
- Relatively stable market behaviour over the long-term
- Regulated
- Research coverage
- Noticeable speculation only during individual market periods
- Speculation clearly reinforces trends
- Market exaggerations, increased volatility as a consequence

Fundamental character increases forecast reliability – but...



Scrap - the unknown market parameter

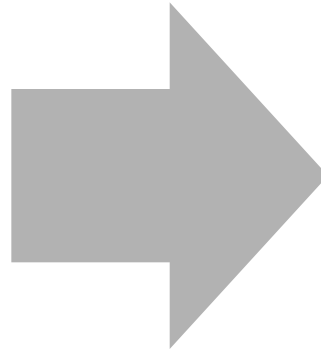
Statistical data

- No statistical information about scrap as a nickel resource although
 - 50% of nickel units for stainless-steel production are provided from stainless steel scrap
 - Stainless-steel and alloy producers are the main consumers of nickel
- Hardly any consideration given to the scrap factor by analysts and investors
- Causes:
 - Lack of statistics
 - No distinct knowledge of the scrap market
- Varying interpretation of LME stocks due to different valuations / assessments of the scrap market by market participants

**... analysts and investors on a difficult mission:
Fundamentally driven nickel market only semi-familiar to the supply side**

Call for more transparency

- Statistical capturing of nickel resources contained in stainless steel scrap
- Improved dialogue between market participants
- Strict monitoring of the market for critical trading positions
- Research intensification



- Higher quality research through comprehensive market information
- Better market understanding
- Reduced volatility through information and market depth

As a main participant of and active hedger on the nickel market, the stainless steel (scrap) industry requires comprehensive information as a decision support and a strictly monitored market for safe trading

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Research team

- **Ulm University – strong on research**
 - Established in 1967, around 8300 students
 - Faculties: medicine, engineering and information sciences, mathematics, economics and the natural sciences
- **JProf. Dr. Peter N. Posch**
 - Institute of Finance, Ulm University
 - Research topics: raw materials markets, analyses of global economic relationships and credit risks
 - Founding member of the Center of Commodities, Ulm
 - Head of Trading in Credit Derivatives and Active Credit Portfolio Management at BayernLB
 - Doctorate in the dynamics of credit risks, Ulm University
 - Studied philosophy, quantitative economics, legal sciences, Friedrich-Wilhelm University, Bonn
- **Samuel Pollege**
 - Graduate Economist
 - Ph.D. student at the Institute of Finance, Ulm University

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Oryx Stainless Group

- Oryx Stainless – the internationally leading raw materials trading group
- Oryx Stainless is one of the world's leading trading organisations for raw materials employed in the stainless steel industry
- Its core business lies in handling and processing stainless steel scrap



Mülheim an der Ruhr, Germany



Dordrecht, The Netherlands

Facts & Figures

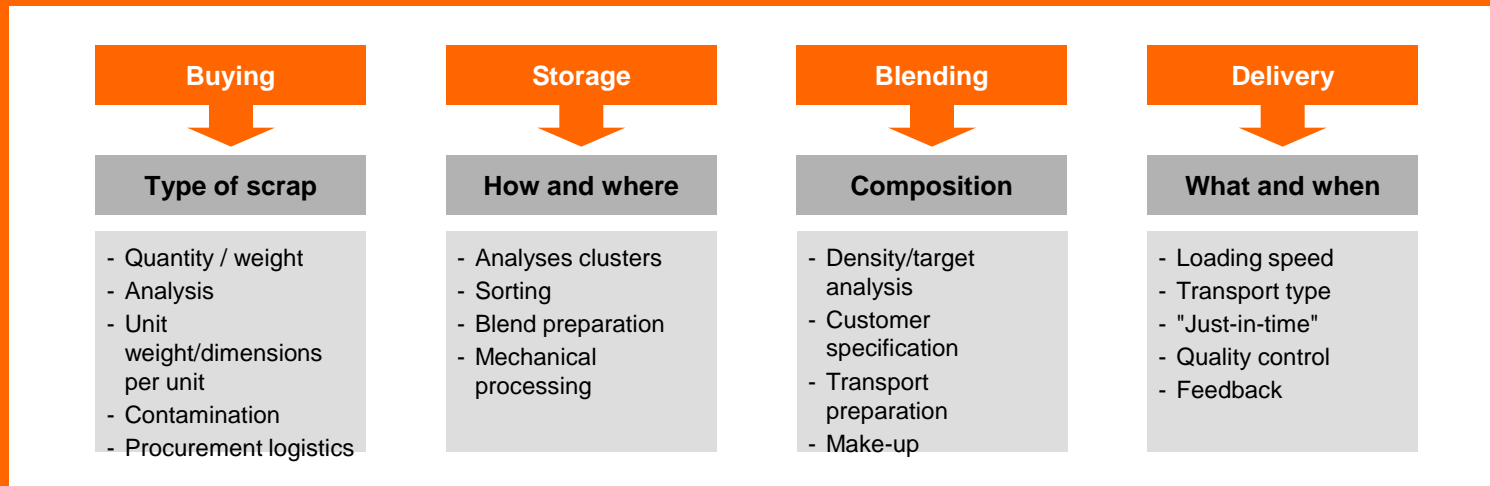
- Established: 1990
- Locations: Mülheim an der Ruhr, Germany, and Dordrecht, the Netherlands
- Oryx Stainless, a KMR Group brand, possesses a stable shareholder base that fully supports the company's long-term strategy of sustainable growth. All owners have assumed entrepreneurial responsibility within the holding's management or in the individual divisions
- Tonnage (2010): around 450,000 t
- Global market share, approx. 6%
- Workforce (2011): 85

Oryx Stainless Group: Pioneer of Blending

Blending = upgrading of secondary raw materials by mixing various types of scrap steel and stainless steel for use in electric steel plants using electric-arc processes

Oryx Blends replace such primary raw materials as ferro-nickel, ferro-chrome and ferro-molybdenum.

From scrap to high-quality raw materials blends – step by step



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