

A VIEW OF THE GLOBAL MERCHANT PIG IRON MARKET

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Introduction

The invitation to make this presentation to IPIS members represented quite a challenge to us as consultants – what could we tell such an audience of experts that they didn't know already? The assignments that we have undertaken in the field of the international merchant pig iron market have generally been for prospective producers. Such companies require basic information about the business itself as well as an insight into the key issues that will affect their projects. Some of our clients have started with almost no knowledge of the business while others have wanted to compare our findings with their own.

Some brief biographical information about D.K. Cattell & Associates is given in Slide 1.

Confidentiality constraints do not allow us to give detailed information about our clients or their projects, but a brief synopsis of relevant assignments is given in Slide 2. It is perhaps of interest to note that one of these projects has been cancelled, one is dormant, one has been scaled back and two are very much alive and moving forwards.

In this presentation we will address three areas of the business: demand-side issues, supply-side issues and the outlook for ferrous metal prices.

Demand-side Issues

Starting with demand, Metal Strategies Inc. maintains and regularly updates its forecast for the world steel metal balance. The current forecast is shown in Slide 3 [for those who like to see graphical representation of the data, this is given in Slide 4]. Underlying the basic steel production numbers are assumed compound annual growth rates of about 1.5% for steel consumption and 1.1% for crude steel production.

The increase in the share of EAF steel production is well understood, but the average figures shown in Slide 3 hide considerable regional variations. Slide 5 shows the regional position for the years 2000 [historical data], 2005 and 2010 [forecast]. In all regions, we foresee a continuation of the shift towards EAF production over the forecast period.

Reverting to Slide 3, the distribution of metallics is of course somewhat judgmental. Commenting on the individual materials:

- ❑ We see a rather flat development for merchant pig iron [MPI] through 2005. The increase during the second half of the decade is likely to come, in part at least, from one or more of the new technologies such as Corex, HIs melt, Tecnoled, etc. We doubt that there will be many new blast furnace MPI plants built [one exception might be the 0.55 million tonnes per year plant that is reportedly being considered by Nucor and CVRD in northern Brazil].
- ❑ In referring to “alternative hot metal” we mean liquid iron produced by one of the same new technologies, but at a plant adjacent to the melt shop rather than near to the iron ore source.
- ❑ There is considerable latent merchant DRI / HBI capacity – in North America, Venezuela and Australia for example. There are also new projects on various drawing boards, although we doubt if many of these will come to fruition until existing capacity is better utilised. There is also scope for increased productivity from existing direct reduction plants through higher operating temperatures, improved gas reforming, etc.
- ❑ As far as scrap is concerned, we see no overall shortage as such, although supply of the higher quality, low residual grades will tend to tighten for reasons which are well known, hence the slight reduction in scrap’s share of EAF metallics supply.

Supply-side issues

Coming to the supply side, Slide 6 gives a graphical representation of MPI exports during the last ten years. The underlying data is based on a number of sources – and the data for 2000 and 2001 are estimated in some cases. As is well known and clear from this slide, global MPI supply is dominated by Russia, Brazil, Ukraine, China and Japan. Some observations on each of these producer countries are as follows:

- ❑ The future prospects for Japanese exports have exercised many minds over the last year or so. Japan has traditionally been an opportunistic exporter of pig iron, exporting material that is surplus to in-house and domestic requirements. Until relatively recently, the steel industry consolidation process that has been going on in Europe for many years has not been much emulated by the Japanese. However, now that the Japanese steel mills have at last accepted the need for consolidation, it seems reasonable to believe that before long there will be more blast furnace closures - with a corresponding threat to cold pig iron supply.
- ❑ The turnaround in the Chinese supply / demand balance has been dramatic indeed and was not, we suspect, predicted to its full extent by many. The big question is: how long can the growth in steel production be sustained at this rate? Given the underlying fundamentals, the answer is probably for some

time yet. There will no doubt continue to be exports of pig iron from China and availability will increase opportunistically from time to time as China eventually succumbs to the business cycle from which the rest of the world suffers.

- The development of Russian pig iron exports has been equally dramatic and clearly the gap left by the Chinese has been in large part filled by Russian producers. Is this level of exports sustainable in the longer term? If domestic demand increases, surely low margin [some might have said no margin in the latter part of 2001] exports will be replaced by higher margin domestic sales, as has happened in China. Also, it seems reasonable to believe that in order to remain competitive in the international markets and at the same time generate sufficient cash and profits to enable reinvestment in their production facilities, Russian producers will need to reduce raw material, production and logistics costs and / or increase their selling prices. Exchange rates played a major role in the competitiveness of Russian pig iron exports in the latter years of the 1990's, but after several years of relative exchange rate stability, like most competitive advantages, Russia's has probably been eroded to a significant extent.
- Ukrainian, like Japanese pig iron exports have generally been opportunistic and availability is driven by the level of domestic demand. The government's economic plan for the first half of the current decade called for significant economic growth [6.5% annually 2002-2004] – whether or not this is being or will be fulfilled seems questionable, the more so given the apparent current emphasis on Russia by the western world. Any significant growth in the Ukrainian domestic economy could be expected to impact eventually on export availability of iron and steel products. Otherwise, continuation of the status quo would appear to be an appropriate forecast.
- As far as Brazil is concerned, we do not foresee a significant increase in overall pig iron exports as such, but expect the shift from the south to the north to continue, also the increase in the share of basic pig iron. There is likely to be continued, perhaps increased inter-dependence between Brazilian pig iron producers and the US steel industry, for example the proposed joint venture between CVRD and Nucor. It is also possible that Brazil will export pig iron produced by alternative technologies – for example, the Tecored plant being considered by Samarco and Northwest Steel & Wire.

We see some competitive threats to established MPI suppliers, summarised in Slide 7.

As can be seen from Slide 8 [thanks to www.vai.com for the picture of the Port Hedland HBI plant], production and shipments of DRI / HBI have grown significantly over the last few years: in 2000, production reached almost 45 million tonnes and shipments almost 10 million tonnes, both falling back slightly in 2001. With the poor prices available to DRI / HBI producers in 2000 + 2001, many merchant plants, particularly in North America, were idled and many remain so. With the recovery in ferrous metal prices during the first half of

2002 and with the better prospects for North American steel, it would be surprising if the owners of some of these plants were not by now considering restarting production. There are also various direct reduction plants which for a variety of reasons - some technical, some commercial, some economic - have not been operating at full capacity - for example, Boodarie Iron, Orinoco Iron, Posven, etc. Such latent capacity will always constitute a potential threat to competing suppliers.

Improvements in raw material technology and other technological developments since the mid 1990's have enabled many direct reduction plants to increase their productivity through higher operating temperatures and this trend can be expected to continue. Another trend in direct reduction is increased module size, for example Midrex already offers its SUPER MEGAMOD with capacity up to 2.7 million tonnes per year DRI and an even larger module with annual capacity of 3 million tonnes is apparently on the drawing board.

A great deal has been written and said on the subject of alternative ironmaking processes and no doubt this subject has been debated on many occasions at IPIS meetings. We do not intend to continue the debate here, but would just like to observe that, despite the many very expensive adventures and failures since time immemorial, the quest for lower cost and more flexible alternatives to the blast furnace continues and there must be a reasonable expectation that one or more of the many processes currently under development or evaluation will eventually succeed technically, commercially and economically. Indeed, it can be argued that the Corex process is already one such example. Such processes offer scope for production of both cold pig iron for the merchant trade and hot metal for integrated mini steel mills.

Ferrous Metallics Prices

Coming to the issue of ferrous metallics prices, first of all the historical data, are shown in Slide 9. Scrap prices are \$ per gross tonne delivered Chicago area and HBI / MPI prices are \$ per metric tonne, FOB barge New Orleans. Individual prices are period averages. As can be seen from this slide, there is a close correlation between the prices for the different materials.

Metal Strategies Inc. also maintains a forecast of ferrous metallics prices and the current version of this is shown graphically in Slide 10. As can be seen, this forecast attempts to take into account the business cycle.

In attempting to analyse the historical MPI price data, we have inserted a linear trend line into the chart, as shown in Slide 11. A word of caution is appropriate at this point: today's software makes it very easy to use data selectively to produce the desired result and trend lines can be produced to order by selecting the appropriate data points. This is definitely not the case with the chart in slide 11 - where data for the most recent 10 years period has been used

arbitrarily. Whilst one can debate the slope of the historical trend line, we suspect that few would argue with its southerly direction.

We have carried out the same exercise for the MPI price forecast for the period up to 2010, shown in Slide 12. Here the slope of the trend line has turned to a slightly northerly direction. Again, one can debate the slope of the trend line, but we believe that its direction is a reasonable hypothesis, given the assumed growth in ferrous metalics demand, tighter scrap quality constraints, etc. We have advised our clients that a new MPI plant needs to be able to survive at the bottom end of the price cycle – which today probably means something in the range of \$110 per tonne [period average].

D.K. CATTELL PTY LTD & ASSOCIATES

- ◉ **Dan Cattell [D.K Cattell Pty Ltd., Western Australia]**
 - ◉ >40 years commercial experience with minerals and metals, the last 30 in Australia, mostly with BHP Minerals and related organisations. Now provides consultancy and representation services in the minerals and metals fields.
- ◉ **Chris Barrington [Raw Material Solutions Ltd., UK]**
 - ◉ >30 years commercial and managerial experience with mineral raw materials, mostly in the areas of steelmaking raw materials and non-metallic minerals. RMS acts as distributor of mineral raw materials and provides consultancy services in related fields.
- ◉ **Chris Plummer [Metal Strategies Inc., USA]**
 - ◉ MD of Metal Strategies, an international consulting firm specialising in commercial and competitive advisory services to the global steel, aluminium and metals industries. Is MSI's principal steel industry consultant, having been active in the field nearly 20 years.

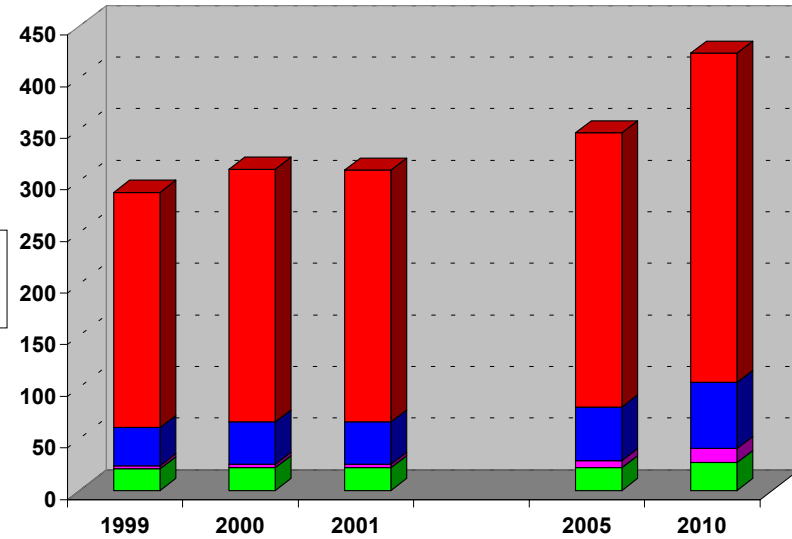
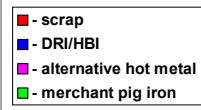
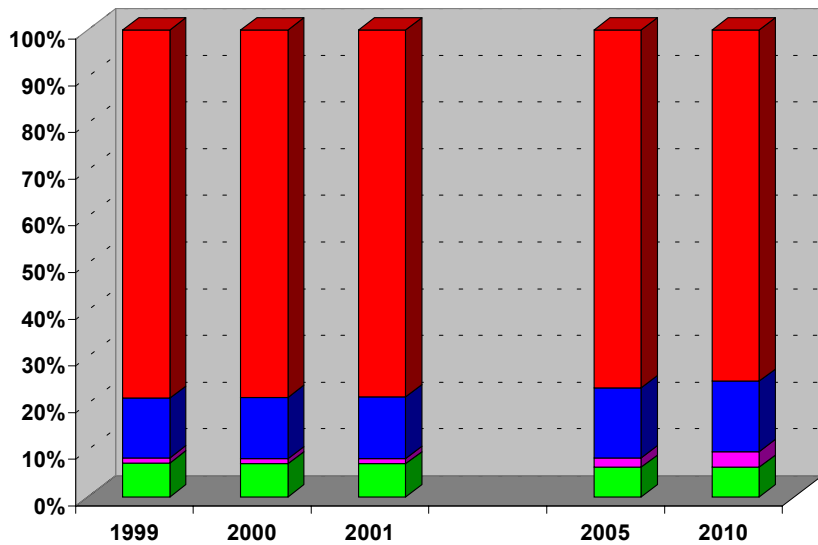
Pig Iron Projects undertaken

- ▶ Overview of and prospects for the global High Purity Pig Iron market for a prospective producer of TiO_2 slag and nodular pig iron in Southern Africa [2000].
- ▶ Overview of Merchant Pig Iron Market for a prospective producer of Basic Pig Iron in Western Australia [2001]
- ▶ Overview of Merchant Pig Iron Market for the owner of an iron ore deposit in South America [2001].
- ▶ Overview of Merchant Pig Iron Market for a prospective producer of Basic Pig Iron by a new process in Australia [2002].
- ▶ Overview of the Merchant Pig Iron Market for a second prospective producer of Basic Pig Iron by a different new process in Australia [2002].

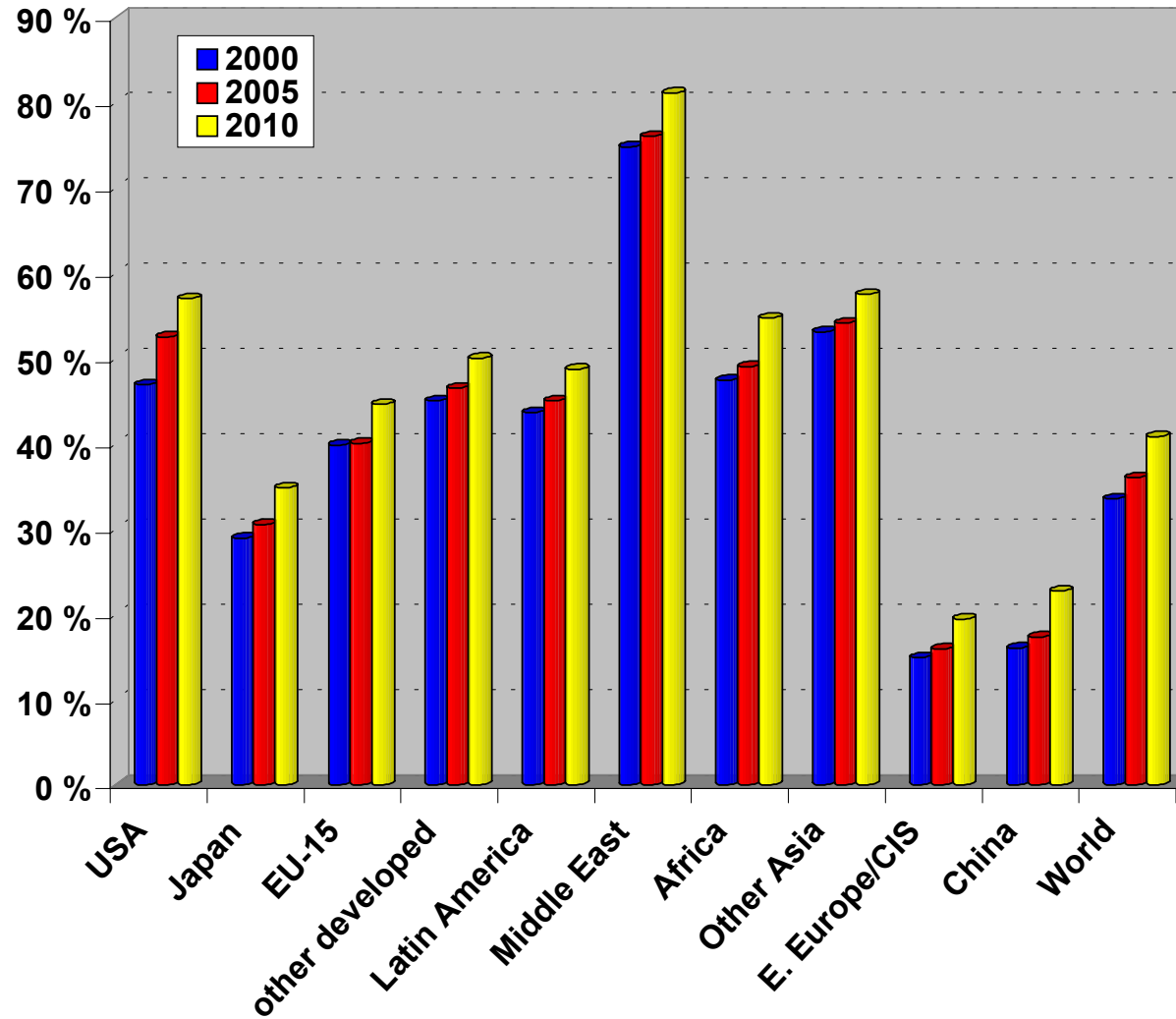
World Steel Metallics Balance [tonnes x 10⁶]

	1999	2000	2001		2005	2010
World Steel Production	785	847	845		881	945
- of which EAF	263	284	283		317	386
- EAF share	33.5%	33.5%	33.4%		36.0%	40.8%
EAF Metallics Consumption	289	311	310		348	424
- merchant pig iron	21	22	22		22	27
- alternative hot metal	3.1	3.5	3.5		7	14
- DRI/HBI	37	41	41		52	64
- scrap	228	245	244		266	319
EAF Metallics Consumption share						
- merchant pig iron	7.3%	7.1%	7.1%		6.4%	6.4%
- alternative hot metal	1.1%	1.1%	1.1%		2.1%	3.4%
- DRI/HBI	12.8%	13.2%	13.2%		15.0%	15.0%
- scrap	78.8%	78.6%	78.6%		76.5%	75.2%

EAF Metallics Share [%] and Consumption [tonnes x 10⁶]

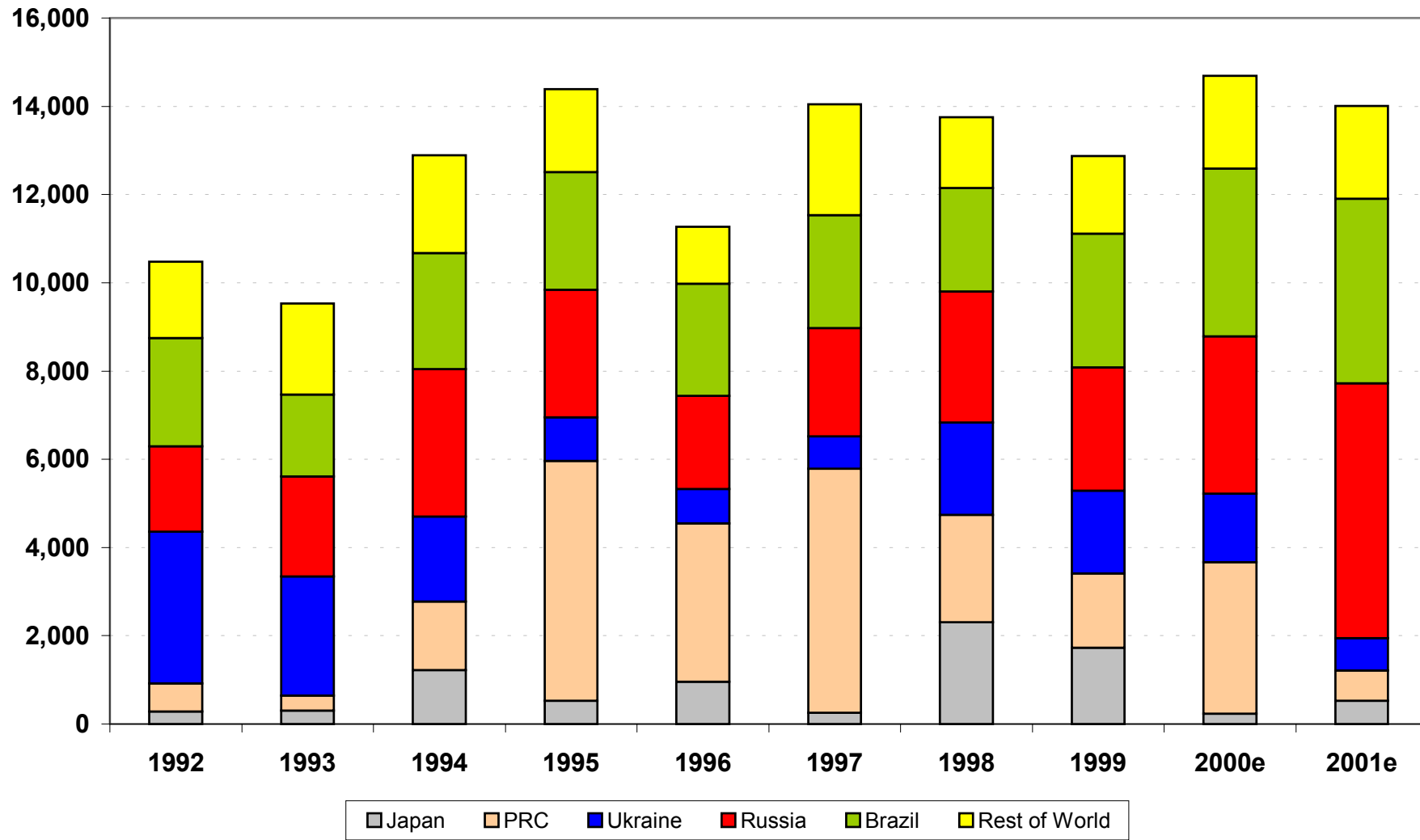


EAF share of crude steel production



Slide 5

MPI Exports [tonnes x 10³]

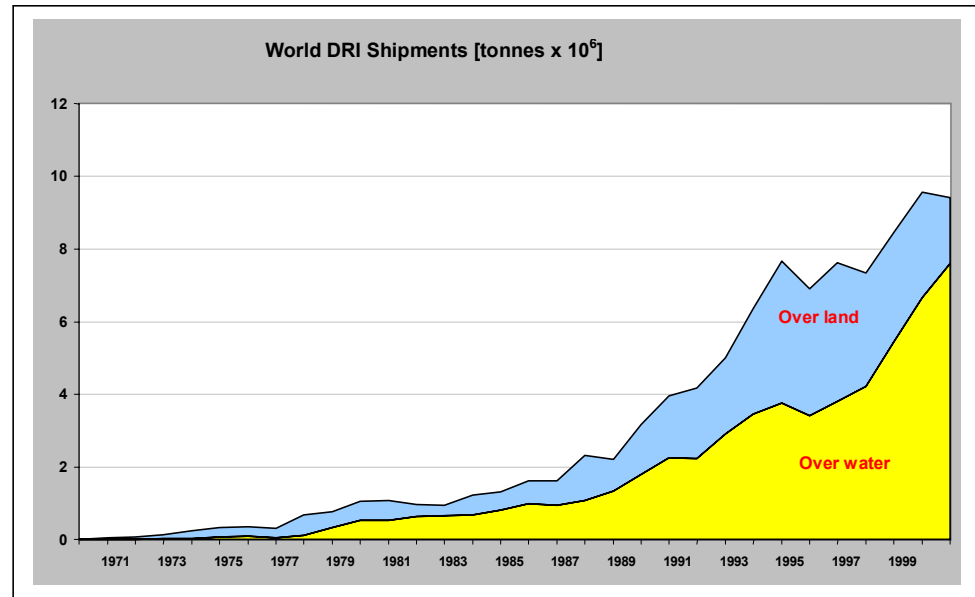
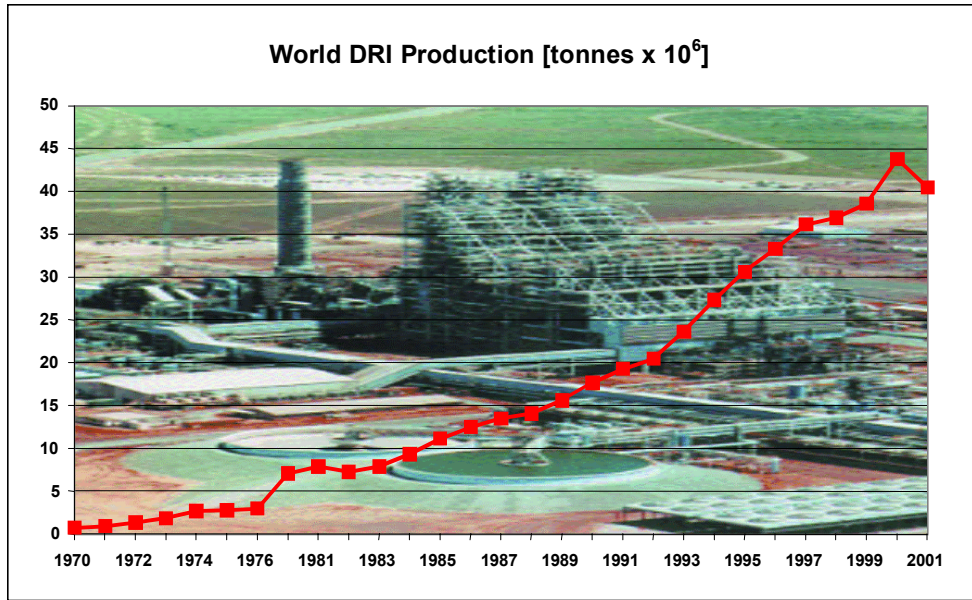


Slide 6

Supply-side issues: competitive threats

- ▶ Increased DRI + HBI capacity:
 - ▶ re-start of idled plants
 - ▶ increased capacity utilisation at existing plants
 - ▶ increased productivity at existing plants
 - ▶ larger module size for new plants
- ▶ Competition from new alternative iron processes:
 - ▶ Corex, Iron Carbide, Hismelt, Circored, Iron Dynamics, Ausmelt, etc.

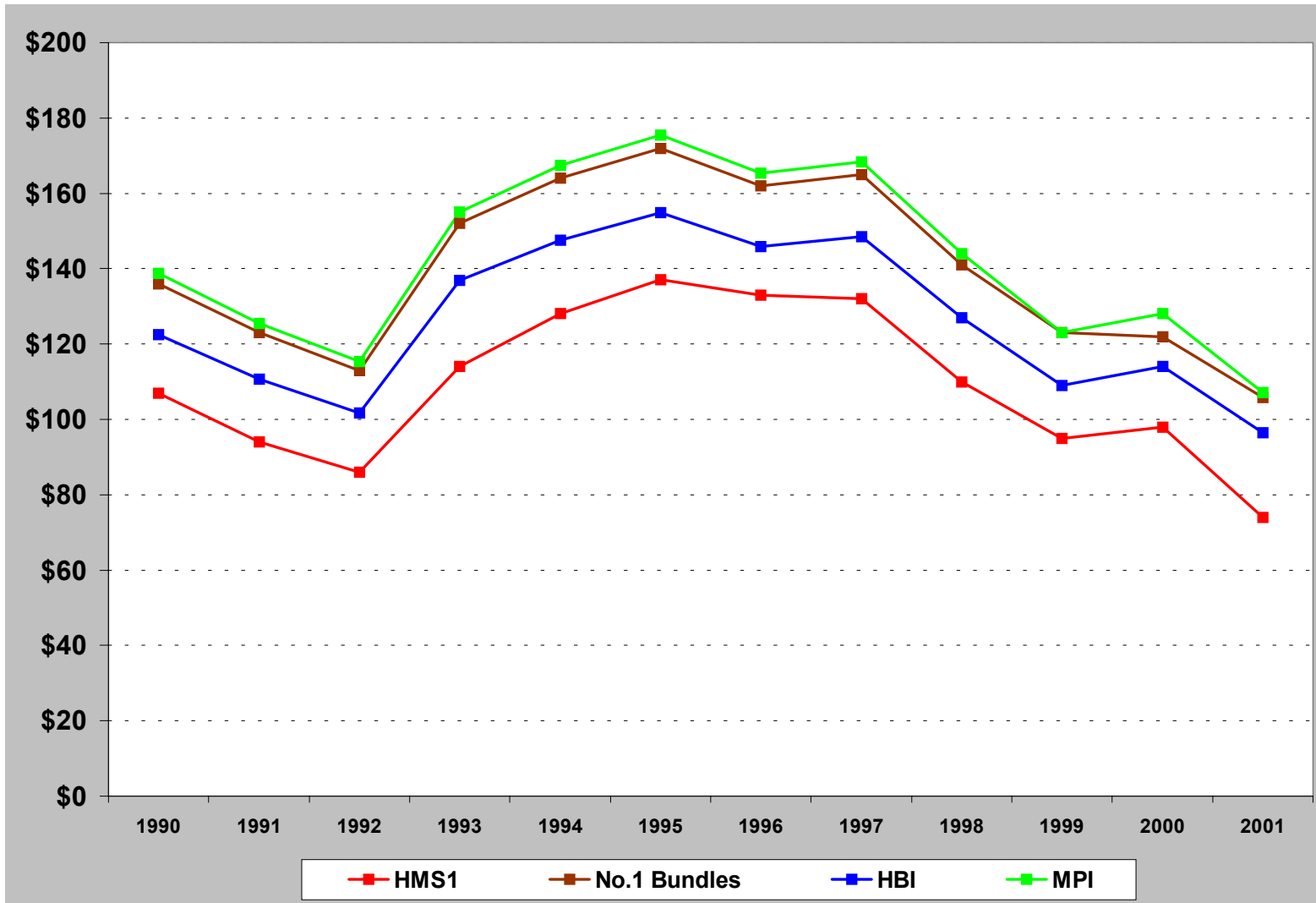
DRI / HBI production and shipments



Slide 8

Ferrous Metalics Price History

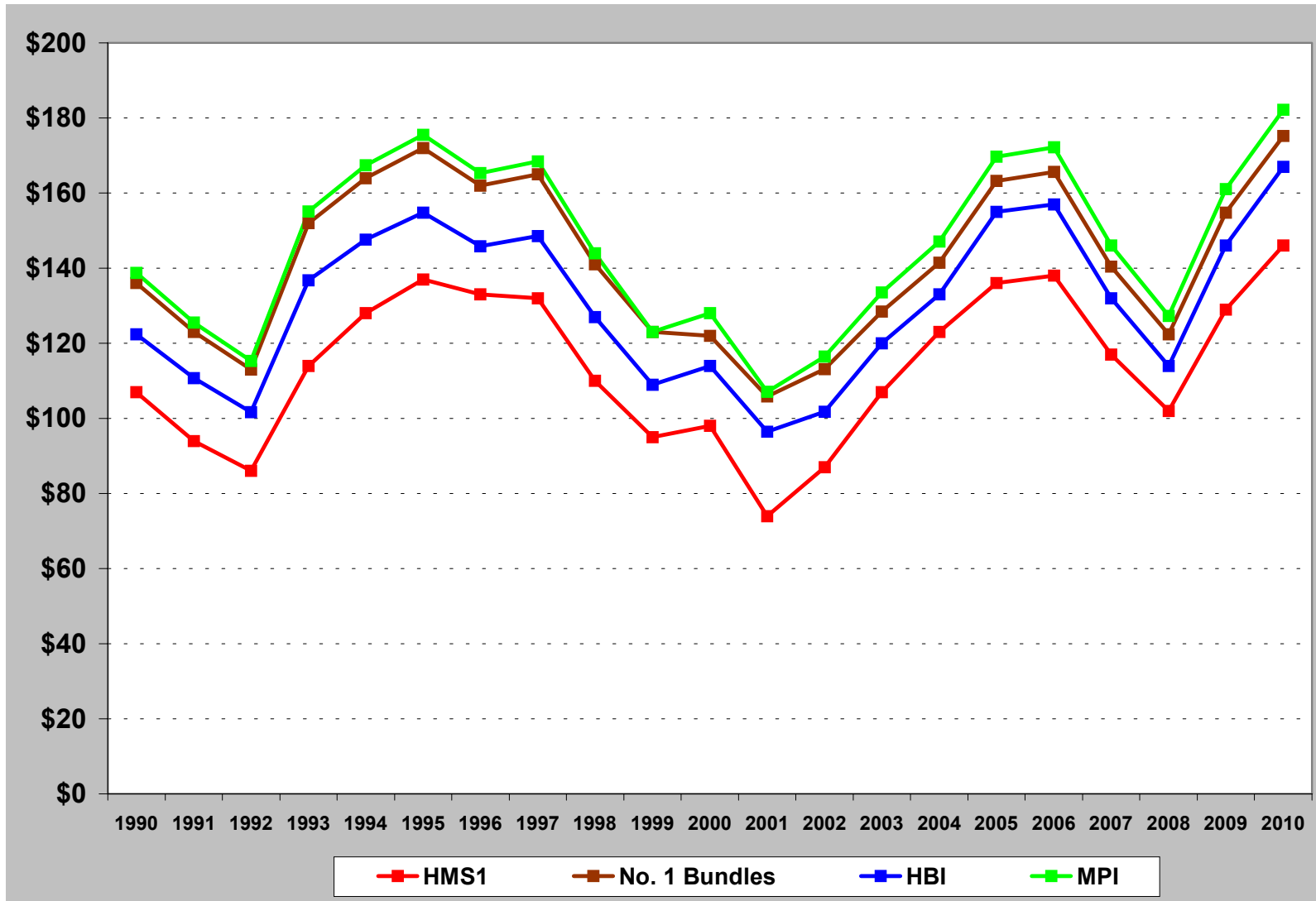
[period averages]



Slide 9

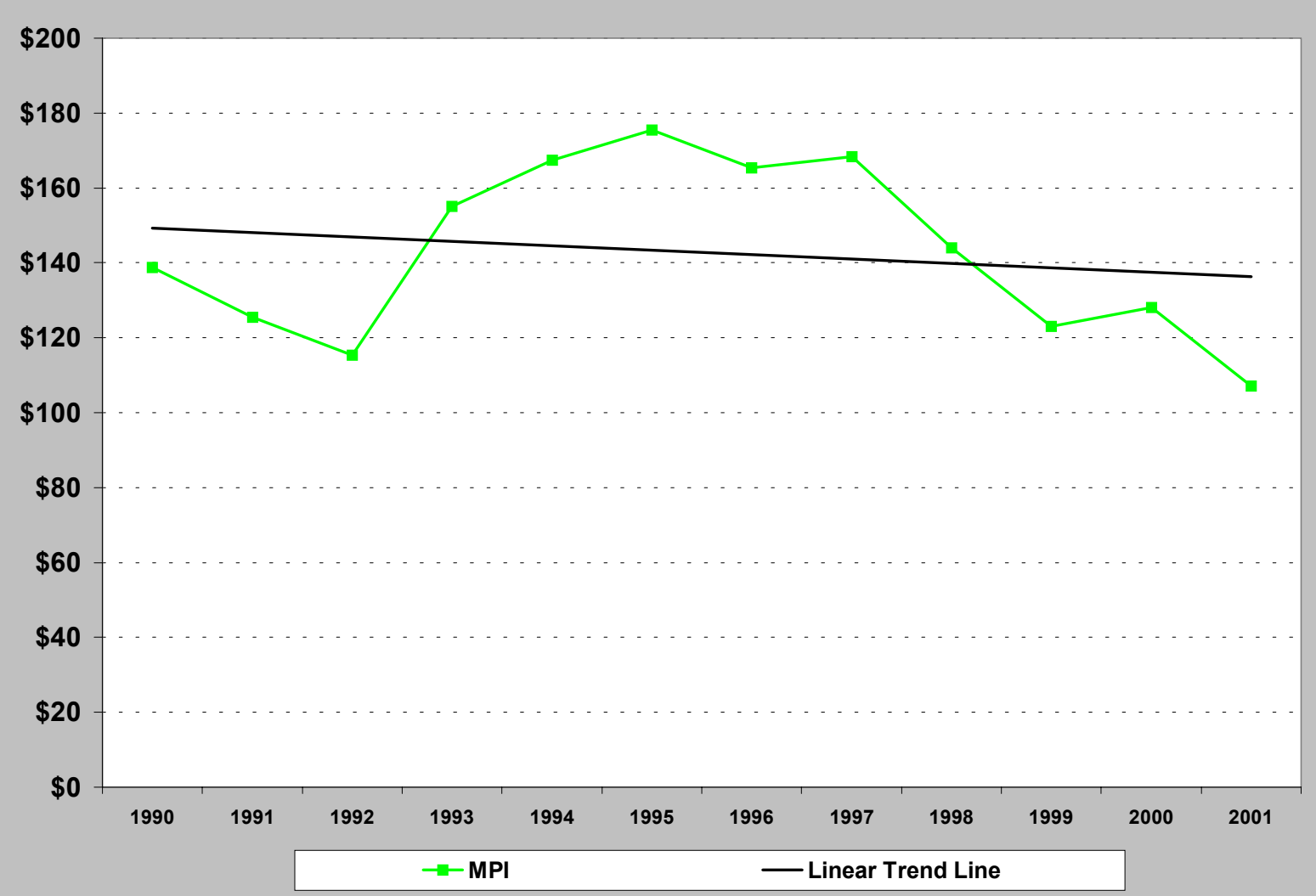
Ferrous Metallics Price Forecast

[period averages]

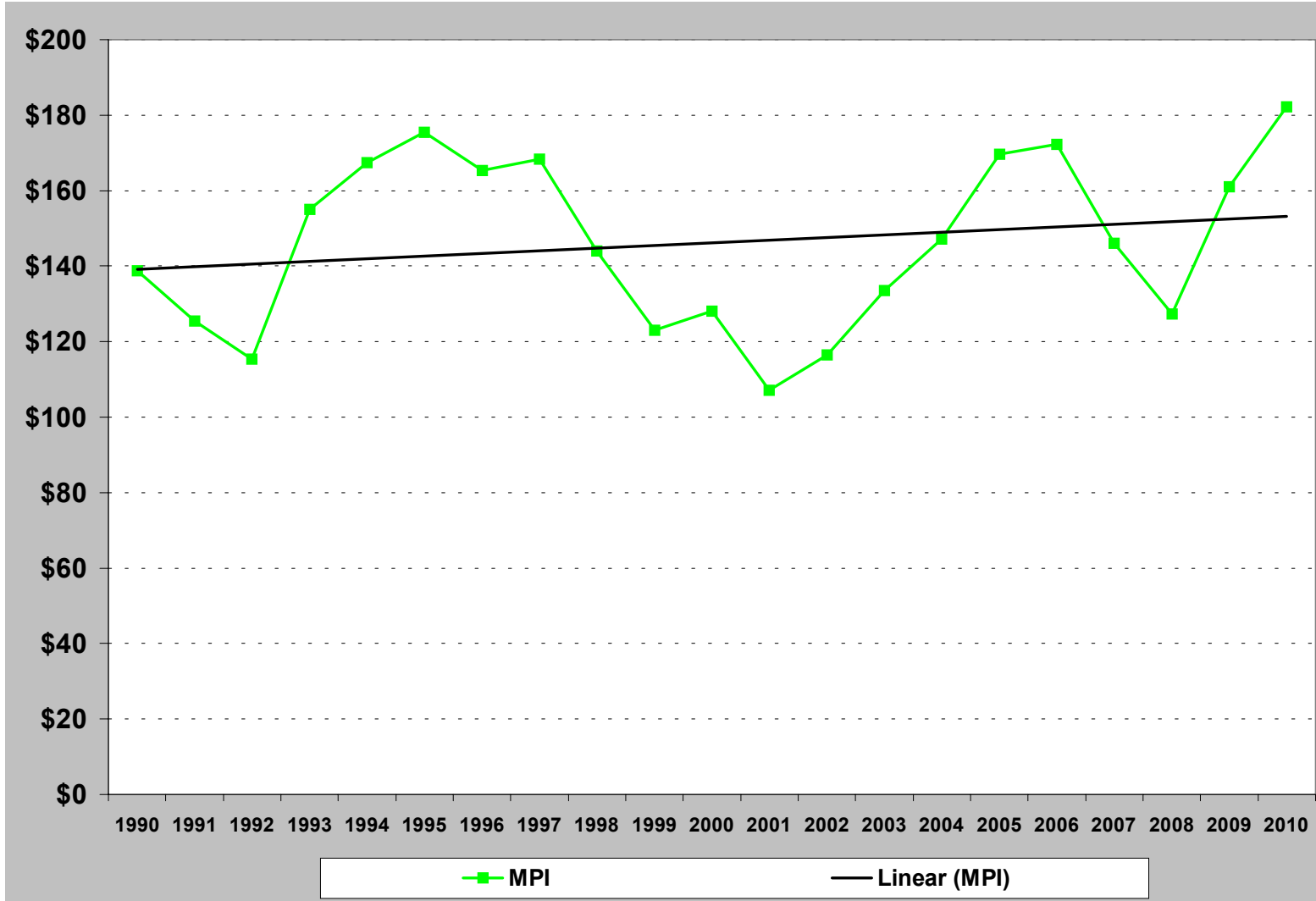


Slide 10

MPI Historical Price Trend



MPI Price Forecast Trend



Slide 12