Written Statement of Jorge Vazquez

Founder and Managing Director of HARBOR Aluminum Intelligence LLC

to

The Permanent Subcommittee on Investigations

Hearing on

"Wall Street Bank Involvement With Physical Commodities"

November 18, 2014

Chairman Mr. Levin, Ranking Member Mr. McCain and other members of the Subcommittee:

Thank you for your letter dated November 4, 2014 and for your invitation to provide my comments on seven specific areas related to aluminum warehousing in the United States and aluminum physical premiums.

About HARBOR Aluminum Intelligence

HARBOR Aluminum Intelligence Unit LLC (HARBOR) is an independent, privately-owned research firm based in Austin, Texas, that specializes in the global aluminum industry and its various markets. We compile and develop aluminum industry intelligence and market insight, and provide consulting and expert advice to over 300 aluminum industry clients across the globe. We support a majority of the world's most important market players in the bauxite mining, alumina refining, aluminum smelting, metal trading, aluminum processing and end-user segments. Our clients include *Alcoa, Rio Tinto Alcan, Emirates Global Aluminum, Constellium, Aleris, Mitsubishi, Sumitomo, Sapa, Coca-Cola, Tetra Pak, Hyundai and GE*.

Please find below my comments on each of the seven points you kindly invited me to address.

1. The role and function of the London Metal Exchange (LME) and LME-approved warehouses in the aluminum market

The LME has served as the world's premier metal trading exchange since it was formally created in 1877. The Exchange started its aluminum contract in 1978 and today provides the official aluminum base price for virtually all of the transactions taking place in the Western World. Within the LME, one can buy or sell aluminum contracts to be delivered on any specific day in the next three months, for every week in the next six months, and for every month in the next ten-plus years. All future contracts can be settled financially, or physically, using an LME warrant.

The LME provides the structure that allows all market participants to hedge (consumers, producers, traders, banks), speculate (CTAs, Hedge funds, Macro funds, Index funds), and discover price.

With its network of warehouses (today more than 700 around the world), the LME has historically functioned as a "market of last resort"— it can be tapped as a source of physical aluminum during times of shortage, or to deliver/store aluminum during times of over-supply. Today, the LME has primary aluminum inventories of 4.4 million metric tons (mton= 2,204.6 pounds), which represents over 16 percent of the world's annual consumption, excluding China.

In my view, since 2010 the LME has partially failed as an effective "market of last resort" for the aluminum consumer (the manufacturers of aluminum semi-finished products). For example, HARBOR estimates that North America (US, Canada and Mexico) will end 2014 with a primary aluminum production shortfall of 2.4 million mton (about 39 percent of its annual consumption). Although today, LME warehouses in Detroit hold over 1 million mton of aluminum – which equates to 80 percent of the total LME metal stored in North America and 17 percent of annual consumption in the region – a consumer of aluminum who would like to turn to the LME as a market of last resort faces a load-out waiting time of 665 calendar days. This long waiting time and the capital requirements to source the metal out from the warehouse make it prohibitive for the consumer to use the LME as a viable source of last-resort supply. I can confirm this, based on my interaction with HARBOR's aluminum semi-finished manufacturer customers. This situation has prevailed since 2010. Prior to that year waiting times averaged less than 2 weeks and consumers occasionally used the LME as a source of supply (more on this further below).

The LME attempted to address this problem on April 1, 2012, by implementing recommendations that doubled the minimum delivery-out rate from 1,500 mton to 3,000 mton per day. These changes affected LME warehouse companies all over the world if they were holding more than 900,000 tons of metal per location, as was the case in Detroit (which at the time stored over 1.4 million mton). However, raising the load-out minimum rate failed to stop the on-going concentration of metal in Detroit, and the ever-longer load-out queue. On July 1, 2013, the LME addressed the issue again and opened a consultation period on their proposal to make sure unprecedented load-out queues at the affected locations (Detroit included) were reverted to reasonable waiting times. This led to a new rule, announced November 7, 2013, that linked the load-in rate and load-out rate in such a way as to gradually reduce these historic waiting times to 50 days. LME has not yet been able to implement this rule, though they are on track to do so by February 2015. Currently, the load-out queue in LME Detroit stands at around 665 days.

2. The evolution of freight incentives offered by LME-approved warehouses in the United States since 2008, and the impact of those incentives on the aluminum market

What are Warehouse Incentives

As a matter of brief introduction, I would like to describe what a warehouse incentive is and why it is offered.

LME warehouses derive two main sources of income: (i) rental storage income, and (ii) Free On Truck charges ("FOT"). Warehouses charge metal owners daily storage rental fees. FOT is a charge to the metal owner when the metal is loaded out of the warehouse into the truck/vessel/rail car of the holder of the metal. Each year these charges are set by each individual warehouse company per location, notified to the LME, and implemented the first day of April. Today, the published daily rent in Detroit for *Metro International Trade Services LLC (Metro)* warehouses (where 80 percent of the LME aluminum metal in North America is stored) is 51 cent/ton per day (vs. what HARBOR estimates is the cost of storage: less than 7 cent/ton). The FOT charge is $39.95 per mton (vs. what HARBOR estimates is the cost of operation: less than $16 per mton).

Historically, it has been a standard practice for LME-approved warehouses to attract metal to their warehouses by offering financial incentives to producers and traders, known as "freight allowances" or "warehousing incentives" or "warehousing premiums."

In principle, the higher the revenue a warehouse expects (from rental and FOT fees), the greater the incentive that warehouse can offer. Still, warehouses prefer to pay the smallest incentive possible to attract metal and thus maximize their profit.

Every LME-approved warehouse should follow the Exchange rules; probably chief among them is the minimum load-out rate. This is that every warehousing company must load-out at least a minimum amount of metal per location per day when there are requests from those holding warrants in the warehouse (known as warrant cancellations). In practice, LME warehouse companies usually treat the minimum load-out daily rate as a maximum daily load-out rate.

The load-out rate rule applies to all warehousing companies, regardless of how many warehouses they own in a location. For example, currently the minimum load-out rate for warehouses holding over 900,000 mton of metal is 3,000 mton/day. Consider this example: warehouse company A owns 10 warehouses in city X, while warehouse company B owns one warehouse in that same city; both are required to load-out the same total amount of metal in a day (3,000 mton). This means that company A (with ten warehouses) is required to load-out only 300 mton from each, while company B (with a single warehouse in this location/city) must load out the full rate (3,000 mton) from that one warehouse. You can see that this rule incentivizes warehousing companies to attract as much metal as possible in one location in order to reduce the required load-out amount as percentage of the total metal stored.

2007-2008: The Emergence of a Market Surplus

In order to understand the evolution of warehouse incentives in the United States since 2008, it is important to keep in mind the state of the aluminum industry back then.

Demand for primary aluminum in North America and in the World collapsed in 2008 and 2009. Annual primary aluminum demand in the World excepting-China fell by 5 million mton or 20 percent between 2007 and 2009. Monthly aluminum demand in the US and Canada as measured by domestic mill shipments fell more than 36 percent between February 2007 and February 2009. As a result, domestic aluminum producers were suddenly left with no destination to sell a significant portion of their units. Smelters in the Northeast of Canada and the US took a material financial hit: they needed to make sales, move their inventory and generate revenue. They turned to the LME as a market of last resort. Smelters also sold to traders who in turn sold units to the LME and in some cases stored them in off-LME warehouses for financing purposes. Back in those years of financial crisis, the LME's role of market of last resort served smelters well and – faced with the lack of consumer demand at that time – prevented them from shutting down considerable operating capacity.

Detroit has railroad lines, is near a water port, and has become a logistical hub where 30 percent of the trade between Canada and the US takes place. Detroit is also one of the two LME warehouse locations close to the Northeast Canadian aluminum smelters. *Metro* was by far the largest and only dominant LME warehousing company in Detroit. Baltimore is the other LME location in proximity not only to the Northeast Canadian aluminum smelters but also to the US Northeast aluminum smelters. As contrasted to Detroit, Baltimore's LME warehouse market share was split among several warehousing companies.

With unprecedented weakness in demand, primary aluminum inventories soared. LME Detroit went from 15,000 mton in early 2007 to 342,925 mton by the end of April of 2009. In the same period, LME Baltimore which had several warehouse companies, saw inventories climb from 58,000 mton to 350,000 mton. HARBOR estimates that traders/banks stored another 1,000,000 mton in off-LME warehouses during the same period.

There is no public data on warehouse incentives, which are negotiated privately between LME warehouse operators and producers/traders. However, HARBOR's field intelligence allows us to estimate that warehouse incentives in both Detroit and Baltimore fluctuated in the 2007-2008 period between 0.5 and 2.0 cent/lb. This

equated to 1.0-1.5 cent/lb less than the market premium in the Midwest consuming areas (Midwest premium). Warehouses didn't need to pay much incentive to attract the metal because producers had no home for a large volume of their units, and also because warehouses were paying cash and smelters were saving on freight by shipping to warehouses (I will explain this in more detail below).

2009-2013: A Critical Mass of Metal and Effects

As a result of the aluminum market surplus generated, by January 2009, LME Detroit (*Metro*) had accumulated 342,000 mton of primary aluminum in its warehouses. LME Baltimore had similar volumes, but the aluminum was spread among several warehouse companies, which meant each warehouse company held a fraction of what *Metro* had. Given the minimum load-out rate of 1,500 mton per business day that was in force at the time and the 342,000 mton of metal stored in its warehouses, *Metro* had at least 570 calendar days of guaranteed rent/revenue for each additional mton unit it managed to attract. This was dramatically more revenue and capacity to pay warehouse incentives than any other warehouse company in North America. This disparity gave *Metro* three things: the ability to offer more attractive warehouse incentives than its competitors in other locations, b) the ability to pay above-market premiums that consumers were paying (Midwest premium), and c) the start of a self-feeding cycle that allowed the company to permanently increase the metal stored in its warehouses.

In other words, by January 2009, LME Detroit had amassed a critical mass of metal. The unprecedented market surplus was one important factor contributing to this critical mass, but so was the minimum load-out rate which was small relative to the volume and concentration of the metal, as well as the dominance of one warehousing company in this location (*Metro*).

Sitting on this critical mass of aluminum and able to outbid warehousing competitors and consumers, in December 2009 LME Detroit became the world's largest LME location of stored aluminum, with more than 800,000 mton of metal. Aluminum stocks stored in LME Detroit continued to increase for the next 3 years eventually reaching a peak of 1.56 million mton in December 2013. In the meantime, North America experienced a strong bounce in aluminum demand and a growing annual deficit of primary aluminum, which eventually reached 1.5 million tons in 2013 (about half this deficit was commodity ingot).

LME Detroit's critical mass gave smelters additional benefits that incentivized smelters to continue shipping their metal to Detroit despite the growing consumer demand and regional production shortfall. These were:

(a) Cheaper railroad rates. The big volumes traveling *Metro* warehouses in Detroit gave smelters/traders a favored position (economies of scale) in negotiating rail rates that saved them 1-2 cent/lb off the prevailing standard rate vs. diluting those volumes among several plant locations in the Midwest consumer area; b) Cash payments. Warehouses pay cash while selling to consumers typically involves a 30-day wait for payment; c) No credit risk. Selling cash to warehouses shielded the smelter from the risk of default, which smelters faced when selling to consumers; d) Reliable demand. The warehouse provided a steady demand flow, compared to the irregular demand from consumers; e) Flexibility on delivery deadlines. Consumers have tight schedules, whereas the warehouses don't require strict delivery deadlines, which smelters/traders usually leverage into contango profits; and f) Flexibility on metal purity. Smelters were able to ship metal with trace elements such as Lithium (used to increase purity) that some aluminum consumers wouldn't accept.

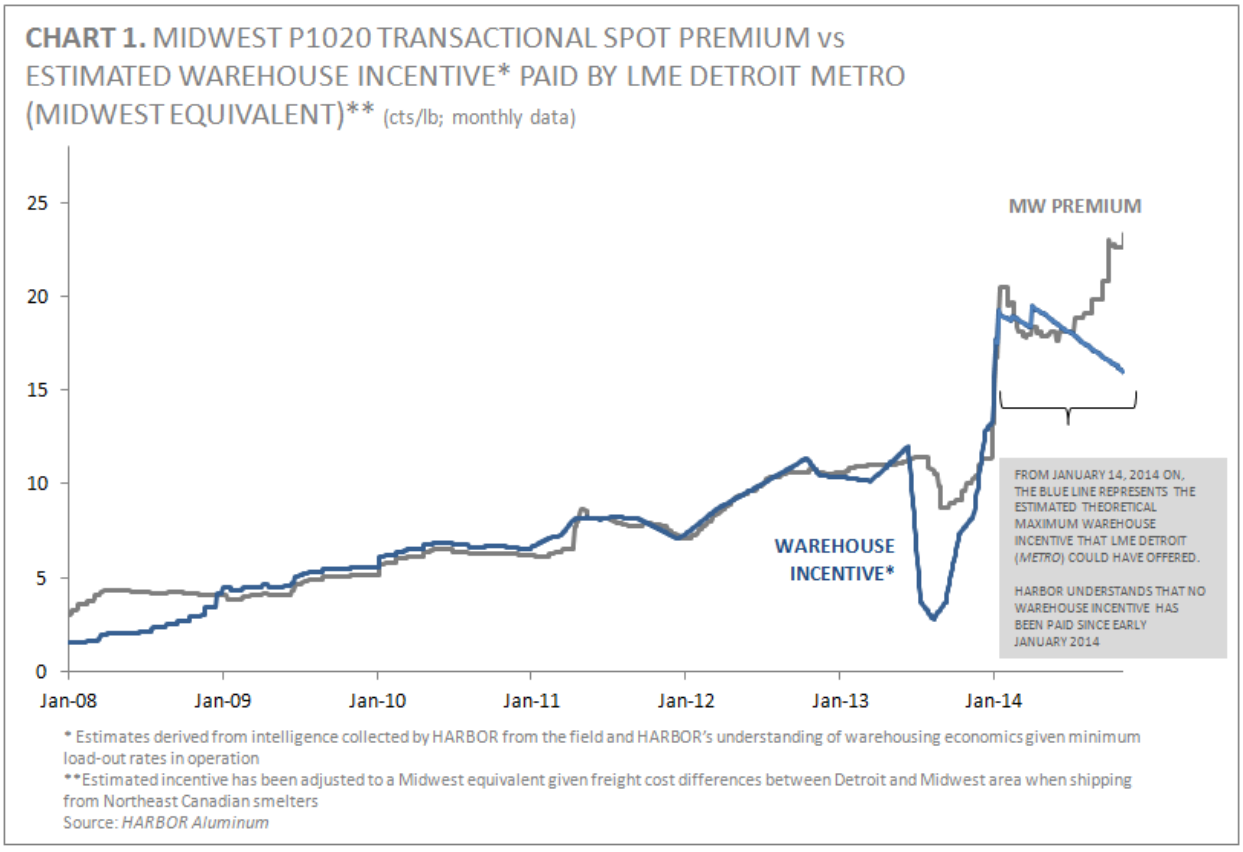
As a result of the above – LME Detroit's leverage benefits and the growing regional deficit of aluminum -- LME stocks in Detroit increased while other LME locations in the region declined.

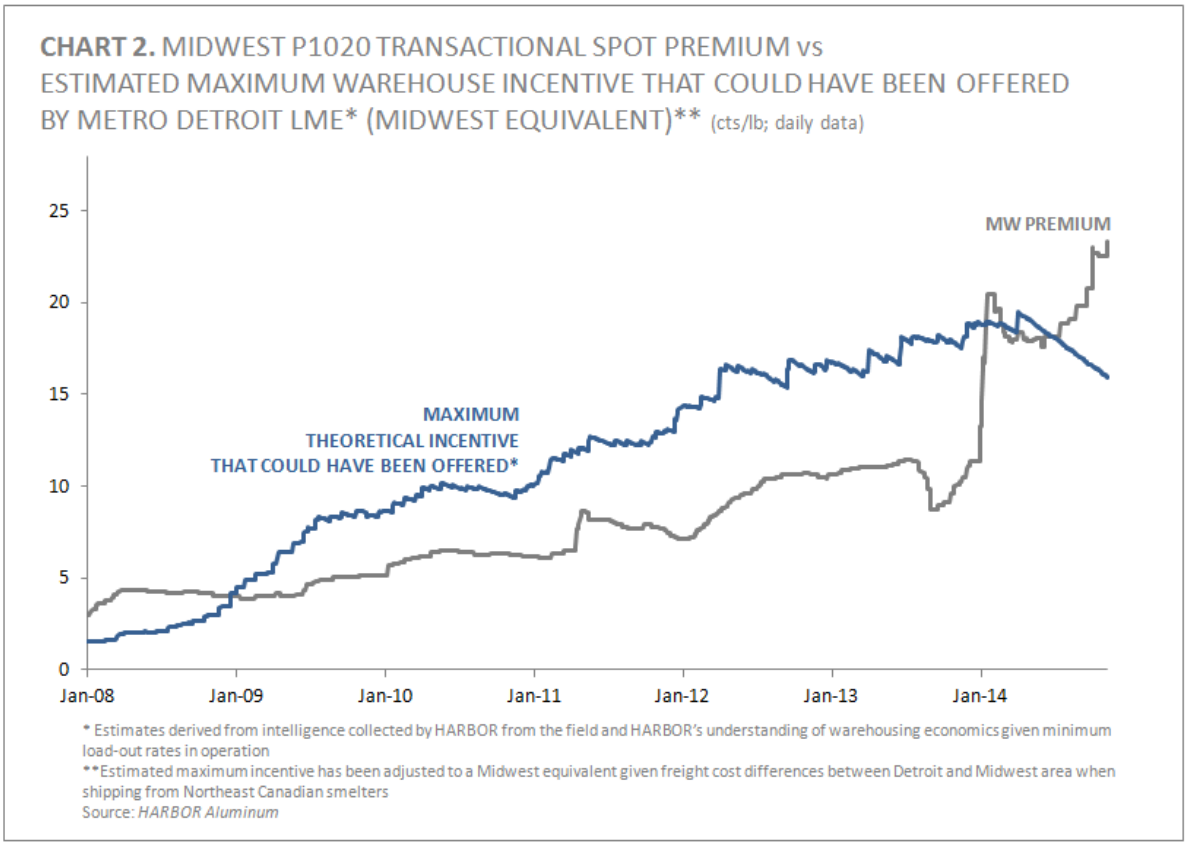
In February 2010, after LME Detroit's critical mass and dominance position was well established, *Goldman Sachs* (*GS*) acquired *Metro*. This purchase made sense, in my view, not only because of the unprecedented benefits of the unique business model that *Metro* possessed, but also because ownership gave *GS* the ability to potentially realize a considerable profit on any off-warrant aluminum position that the company decided to ship to *Metro*.

This worked because *Metro* had to comply with a relatively limited load-out rate as described earlier. Any off-warrant metal that *GS* had then or could potentially obtain could be converted to warrants and these in turn could be sold to another market participant, who would then be required to pay rental fees and income for at least more than 70 days (queue length back then). In February 2010, this overall benefit (warehouse incentive and/or internalization of storage/FOT profit) came to at least 3 cent/lb above the market premiums rates at that time. In other words, moving metal stored in an off-LME warehouse to *Metro*, gave *GS* an automatic theoretical 3 cent/lb minimum profit (that was reasonably expected to increase with any additional lengthening of the queue).

In this context, **Chart 1** shows HARBOR's estimates of the warehouse incentives paid in LME Detroit, compared to the Midwest premium from 2008 to 2014. **Chart 2** shows what HARBOR estimates was the maximum warehouse incentive that LME Detroit had the capacity to pay (without losing money) for each additional deal. These estimates are based on field intelligence and HARBOR's research on warehousing economics.

As I will explain further below, I do not believe that warehouse incentives *per se* have been the main driver of the notorious increase in market premiums that has taken place in North America, particularly since early 2011. Instead, these higher market premiums have been mainly a function of the lengthening of queue at this location that resulted from *Metro's* critical mass and the limited mandatory minimum load-out rate. As shown below, warehouse incentives moved up from about 1 cent/lb ($22 per mton) in early 2008 to over 18.0 cent/lb ($395 per mton) by early 2014.





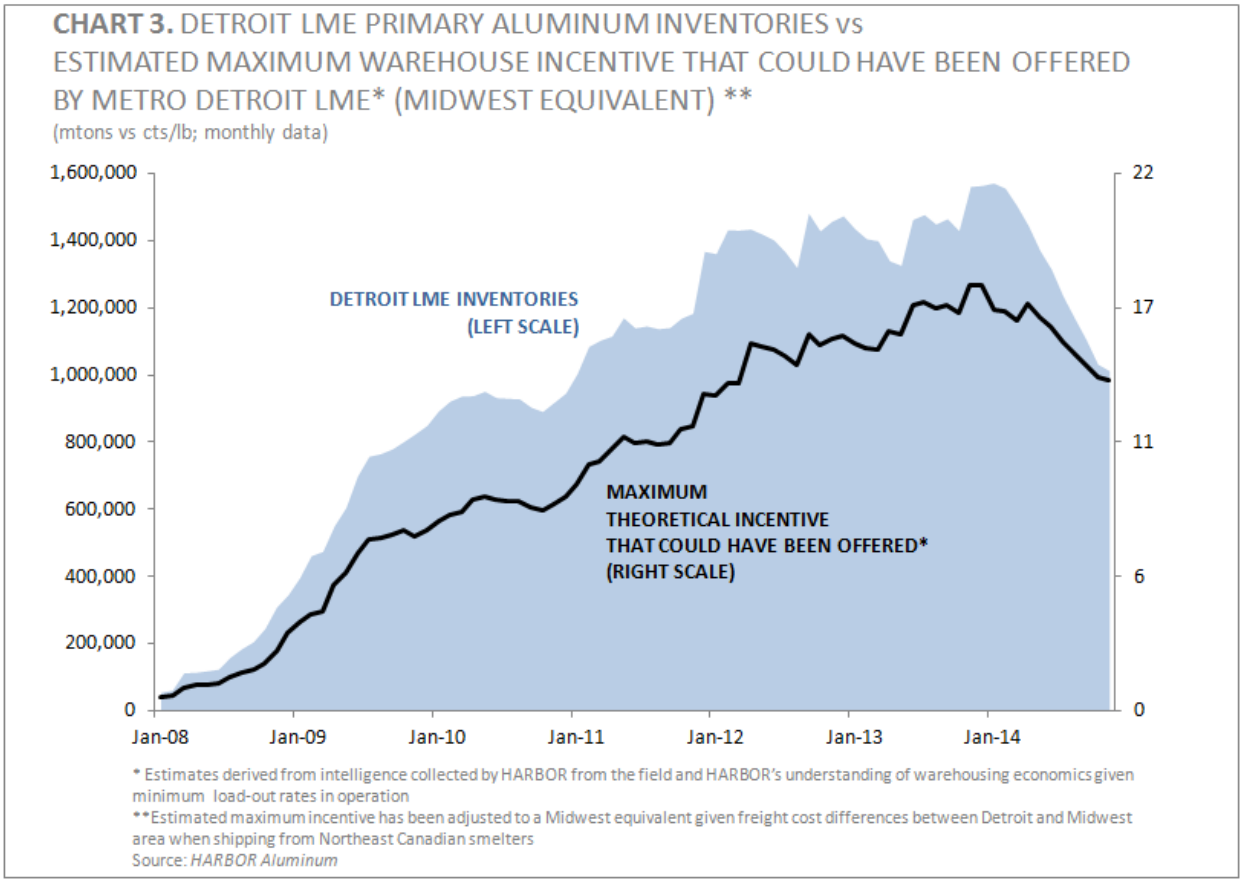
2014: No Longer Capturing Metal and Offering Warehouse Incentives

From June 2009 to early January 2014, *Metro* warehouses managed to capture metal units in spite of the growing market deficit in the region, thanks to its critical mass position and its ability to outbid competing warehouses and consumers of the metal. However, by January 20, 2014, LME Detroit had lost this critical mass condition, and the benefits associated with it. The reasons for this were: a) Production of commodity ingot in the Northeast portions of Canada and the US declined materially. A portion of production was curtailed in favor of Value Added Products (VAP's) such as billet, slab or PFA, while another portion was exported to Europe and Brazil; b) Off-LME stocks kept falling in North America because of the regional market deficit and the volumes previously channeled to LME Detroit; and c) After the LME implemented the new minimum load-out rate in April 2012, LME Detroit was required to load-out at least 3,000 mton per business day.

In other words, the metal units generated by the Northeast Canadian and US smelters fell from an equivalent of 2,780 mton per business day in 2009 to fewer than 2,000 mton in 2014. This meant a drain for *Metro* considering that the load-out rate increased to 3,000 mton.

Indeed, as shown in **Chart 3**, it wasn't until January 2014 that the volumes LME Detroit was capturing finally fell short of what LME Detroit *(Metro)* needed in order to be able to offer a competitive warehouse incentive. From that point on, LME stocks in Detroit started to decline non-stop. Now LME Detroit found itself in a self-feeding cycle, where declining stocks meant an on-going reduction in the maximum warehouse incentive it could offer to attract metal, which in turn fell increasingly short of market premiums. From January's inventory peak to date,

aluminum stocks in LME Detroit have fallen over 500,000 mton to 1.0 million tons. This is a 3.5-year low. I expect inventories of aluminum in LME Detroit to continue to fall further as this cycle feeds on itself.



Please note that while LME Detroit *(Metro)* basically stopped offering warehouse incentives in January 2014, market premiums have continued to rise. This further supports the assertion that warehouse incentives *per se* were not the main driver behind the unprecedented increase in market premiums.

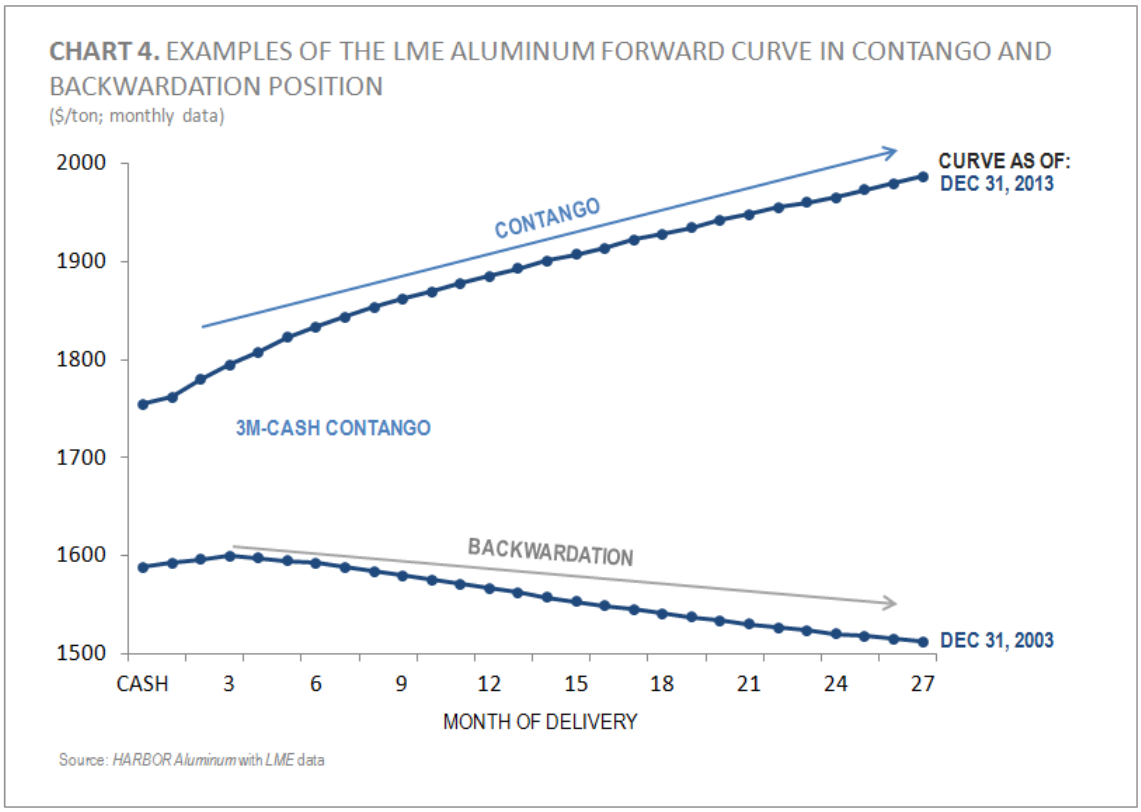
3. The growth of the queue at the Detroit warehouses owned by *Metro International Trade Services*, including the role of large cancellations of LME warrants for aluminum

Before I address cancellations and queue developments in LME Detroit (*Metro*), I would like to explain some essential terms and concepts: contango/backwardation, a financing deal, and load-out queue.

"Contango" and "Financing Deal" Concepts

The market is said to be in *contango* when the price of aluminum that is scheduled for future delivery trades above the spot price. Conversely, the market is said to be in *backwardation* when the spot price trades above the future price. Historically, the LME aluminum market's natural state is to be in contango. The 3M-cash price spread (that is,

the difference between the price for delivery of a warrant in 3 months' time and the spot price of a warrant) is one of the most common reference points in the market, where backwardations arise only occasionally. Only once in every 40 weeks (on average) do backwardations emerge in the 3M-cash spread, and even then they usually last less than a week. Backwardations occur when the demand for a particular contract (spot or future contract) outpaces supply, forcing the buyer to pay a premium (relative to other contracts in the forward curve) in order to get it. **Chart 4** below shows what a contango and backwardation look like.



Cash and carry is the cost of holding aluminum stocks. This is the sum of storage, finance and insurance costs that a market participant incurs in the storing of aluminum.

Market participants can profit from a contango when it is wide enough to cover (or exceed) the cost of carry. This means that a market participant can profit from the contango if he buys physical aluminum (from a producer/trader or a warrant on the LME) and simultaneously sells it in the futures market at a price that is high enough above the spot price to cover the full cost of carry (storage, cost of capital and insurance).

Profiting from the contango is also known as "profiting from borrowing," "cash and carry trading," or doing a "financial deal".

Finance deals can last anywhere from one day to a period of years. The bulk of financing deals today are done for three months or for 1-2 years. Financing deals can be (and often are) rolled over when the deal is scheduled to expire but the contango is wide enough for the financier to do another financing deal and still make a profit.

What and Why a Load-out Queue

A load-out queue in an LME location begins when the amount of metal held by one warehousing company (at that location) for which warrants have been cancelled (ear-marked to leave the warehouse) exceeds the LME-mandated minimum daily load-out rate. For example, if warehousing company A is holding over 900,000 mton in one location and 60,000 mton of metal is cancelled, a queue of 20 business days (28 calendar days) will be formed because of the 3,000 mton daily load-out rate. The more metal that is cancelled, the lengthier the queue will be. This assumes that the warehouse treats the minimum load-out rate as a maximum and doesn't load out a greater volume of metal each day.

Evolution of the Load-out Queue

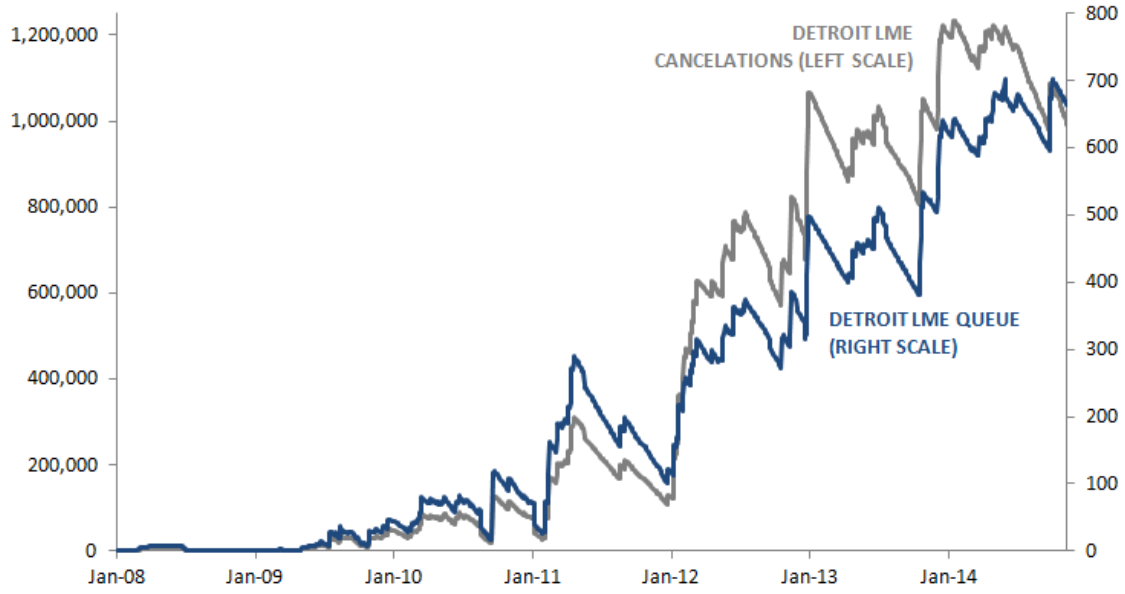
As mentioned above, by June 2009 *Metro* had a critical mass of metal stored in its warehouses. There were at that time cancelled warrants for only 11,275 mton, less than 2% of the 600,000 tons that LME Detroit actually had on hand, and equivalent to only 11 days of queue... When *GS* acquired *Metro* in March 2010, LME Detroit had 45,000 mton in cancelled warrants, 4.9% of total stocks at that time and the equivalent of 44 days of queue (still considered an acceptable waiting time).

Five months later after *GS* acquired *Metro* (LME Detroit), in September 2010, the company started to experience on-going massive cancelations of metal, which stretched the load-out queue to unprecedented waiting times.

Here is the count of these massive cancellations and their impact on the load-out queue in Detroit: Between September 17-20, 2010 (2 business days), over 102,000 mton of metal were cancelled, lengthening the load-out queue from 24 to 116 days. Between February 11 and 14, 2011 (also two business days) another 97,925 mton were cancelled, which drove waiting time to 162 days. Additional cancellations in April 2011 (102,000 mton) drove the queue to 289 days. Cancellations in the January-July 2012 period (826,000 mton) lengthened the queue to 368 days. Cancellations between December 24 and 28, 2012 of 378,875 mton further lengthened the queue to 498 days. Cancellations during December 2013 of 251,400 mton lengthened the queue to 641 days. Cancellations during May 2014 of 33,025 mton lengthened the queue to a new high of 702 days. Today, 98 percent of the 992,900 mton of metal stored in LME Detroit remains in a queue with a waiting time of 665 days. Please see **Chart 5** below.

CHART 5. LME DETROIT PRIMARY ALUMINUM CANCELLED WARRANTS vs ESTIMATED LME LOAD OUT QUEUE IN LME METRO DETROIT*

(mtons vs days; daily data)



*HARBOR's estimate

Source: *HARBOR Aluminum and LME data for Detroit cancelations and data for queues for the last day of each month from April 2014 to date*

Drivers behind Cancellations and the Resulting Waiting Times

As explained above, after *GS* acquired *Metro,* there were unprecedented cancellations of metal resulting in an on-going lengthening of the load-out queue.

HARBOR's intelligence indicates that most of these cancellations were made by a handful of large financial institutions and at least one trading company (backed by financial institution) that: a) had access to ample and cheap credit (at about a fourth of the cost that a typical aluminum manufacturer must bear), b) probably held aluminum stocks outside the LME system, c) are savvy and sophisticated in trading the LME market, and d) own or have access to low cost non-LME warehouses.

It is my view that these players bought, and then cancelled LME warrants (probably paying a very small premium fee, if any, to the previous warrant holder) because:

a) They believed that *Metro's* critical mass of metal (ability to capture units away from the market when demand and regional tightness was growing) had established a firm floor (safety net) in market premiums and warehousing incentives, and a cycle of metal attraction to reinforce it.

b) By cancelling warrants and consequently lengthening the queue, the marginal cost of sourcing any additional metal out of the LME would increase automatically (and pressure market premiums upward as I will discuss below), compared to the average cost they would incur by cancelling the metal. This guaranteed a nearly automatic profit.

For example, consider September 20, 2010. On that day 98,500 mton of metal were cancelled and the queue lengthened from 24 to 116 days. Assuming the cancellation was made by a financial institution, the average cost of sourcing that metal (at full retail storage rates and FOT cost + the cost of financing, less the contango credit) was about 3.1 cent/lb. Sourcing the next mton of metal out of LME Detroit (given the then-116 day queue) implied a minimum cost of 6.8 cent/lb if another player wanted to do the sourcing. This virtually ensured an automatic profit for the party canceling the metal of at least 3.7 cent/lb.

c) By cancelling warrants, these players could expect to amplify the cash-and-carry profit that the existing contango offered, if once the metal out of the LME warehouse, the company stored it in a non-LME warehouse (where retail storage costs are a tenth the cost of LME warehouses).

d) These cancellations would increase the market premium and benefit the mark-to-market valuation (a.k.a. the premium value) of any metal position that was stored in the LME but not cancelled, stored in a non-LME warehouse, and any metal in transit. The increase in the market premium could also boost the value of any metal produced at a smelter (primary aluminum producing company) in which the player who did the cancelling might have shares in.

In other words, with access to ample credit and very low interest rates, these large financial institutions/traders could cancel the metal and, because of the critical mass of metal and the limited load-out rate, ensure themselves of a profit with very little risk.

4. The relationship between warehouse queues and the LME and Midwest Premium prices for aluminum

What is the Midwest Premium?

A physical premium is the additional price paid by a buyer of primary aluminum on top of the LME price. This premium is paid to cover the costs of delivering metal to a buyer's plant/warehouse. The physical premium thus reflects the full logistical cost of delivering metal. This includes freight, insurance, storage, loading/unloading, duty, and cost of financing.

Throughout the world, every major region in the aluminum market has a benchmark premium that reflects the logistical cost applicable to that region. The most important benchmark regional premium in North America is the Midwest premium. Buyers and sellers in North America use this reference premium when negotiating the actual premium to be paid for the supply of physical aluminum. The higher the logistical cost associated with delivering metal (comprising distance, diesel price, ocean rate, finance cost, time, storage rate), the higher the premium.

Again, physical premiums are negotiated bilaterally between buyers and sellers independently of the LME price, and the parties are under no obligation to reveal the agreed-upon premiums to the public. Nonetheless, data providers (such as *Platts*, *Metal Bulletin*, and *HARBOR*) gather this information through voluntary reporting.

It is important to note that in North America, around 75 percent of the negotiated premiums are done on an annual contract basis, and the remainder on the spot market. Premium negotiations can be based on a formula that is referenced to a reported spot premium assessment like the one done by *Platts* or negotiated on a fixed number (i.e. 7 cent/lb). Since premium data providers only consider spot premium transactions based on a fixed number, the spot premiums that these companies publish are based on a small amount of metal, relative to the size of market.

The delivered price paid in North America by end-users for a supply of primary aluminum from smelters and/or traders, is thus typically the LME price plus a physical premium (Midwest premium) paid to deliver the metal to the buyer's plant/warehouse.

What in Reality Determines Market Premiums

Historical evidence demonstrates that primary aluminum premiums ultimately reflect the full logistical cost of obtaining metal. Regional supply-and-demand factors can temporarily affect the regional premium. An example of this was January and February of this year, when the harsh winter materially reduced the supply of aluminum scrap (thus increasing the demand for prompt primary aluminum), which in turn drove market premiums temporarily above the marginal logistical cost of moving the metal. Permanent changes to the premium occur only when regional supply-and-demand factors change the logistical cost of obtaining metal.

For example, consider the typical consumer of primary aluminum. These are aluminum extruders, rollers, castings and wire and cable producers with casthouse capabilities. These consumers have basically three options when sourcing aluminum. They can:

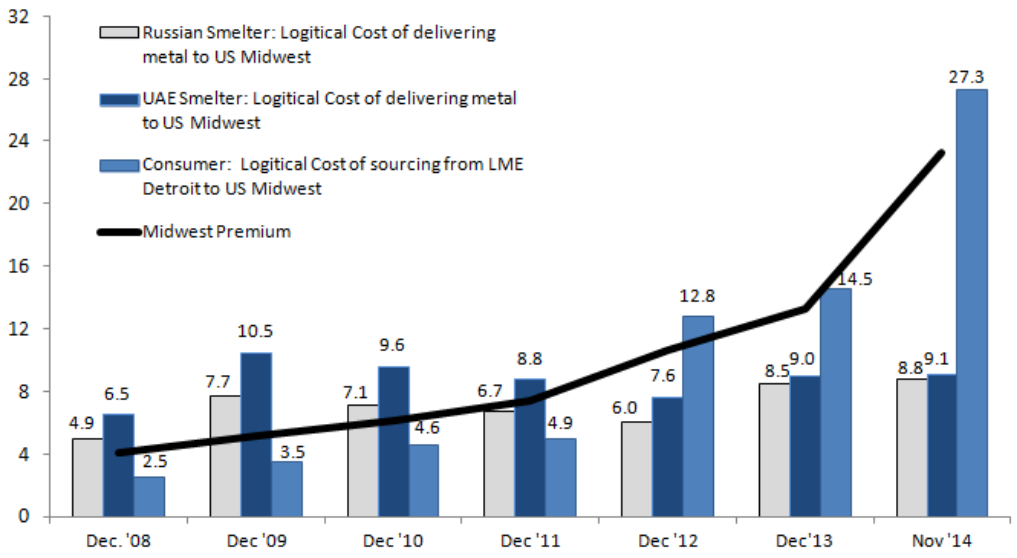
a) Source the metal from a smelter (local or foreign),
b) Source the metal from a trader (local or foreign), or
c) Source the metal from the LME (established as a market of last resort).

In reality, the cost of sourcing metal from the LME (after considering rent, queue length, FOT, finance cost and freight from warehouse to plant) has always operated as a backup for the consumer. It is economically irrational for a consumer to pay a smelter and/or trader a physical premium greater than the cost to that consumer of sourcing the metal itself from an LME warehouse (except when the consumer has an urgent and unexpected need for metal and must source from the nearest supplier, irrespective of cost). The cost of sourcing metal directly from the LME warehouse provides an important point of reference and leverage when negotiating with the smelter and trader. As a result, the consumer almost always gets a better deal from the smelter or trader than they would get directly from the LME. That is why consumers are not found in the queue. It is financial institutions and large trading companies that populate the queue because their cost of capital is a fraction of the cost of the consumer. Thus, the lower the cost associated with sourcing metal out from the LME warehouse, the lower the reference point consumers have to negotiate premiums with smelters and traders, the lower the market premium. The higher the cost associated with sourcing metal from the LME warehouse, ultimately the higher the market premium. In this respect, the longer the queue to load out metal from a dominant warehouse like LME Detroit, the higher the associated cost to source the metal and, inevitably, the higher the premium.

Chart 6 below shows the logistical cost trend of sourcing metal from Russian smelters, Middle East smelters and LME Detroit (which together are the main suppliers of metal to North America). As can be seen, since 2009 the logistical costs of sourcing metal from Russia or the Middle East has remained stable between 6.0-10.5 cent/lb, while the cost of sourcing metal from LME Detroit has risen more than 1,000 percent from 2.5 cent/lb in 2007 to 27.3 cent/lb today. As the cost of sourcing metal from LME Detroit skyrocketed, so did the reference point for consumers to negotiate with and so did market premiums. As a result, the Midwest premium has increased from 2.5 cent/lb in December 2008 to more than 23 cent/lb today.

CHART 6. TOTAL LOGISTICAL* COST OF SOURCING METAL FACED BY THE NORTH AMERICAN CONSUMER

(cent/lb; end of month data)

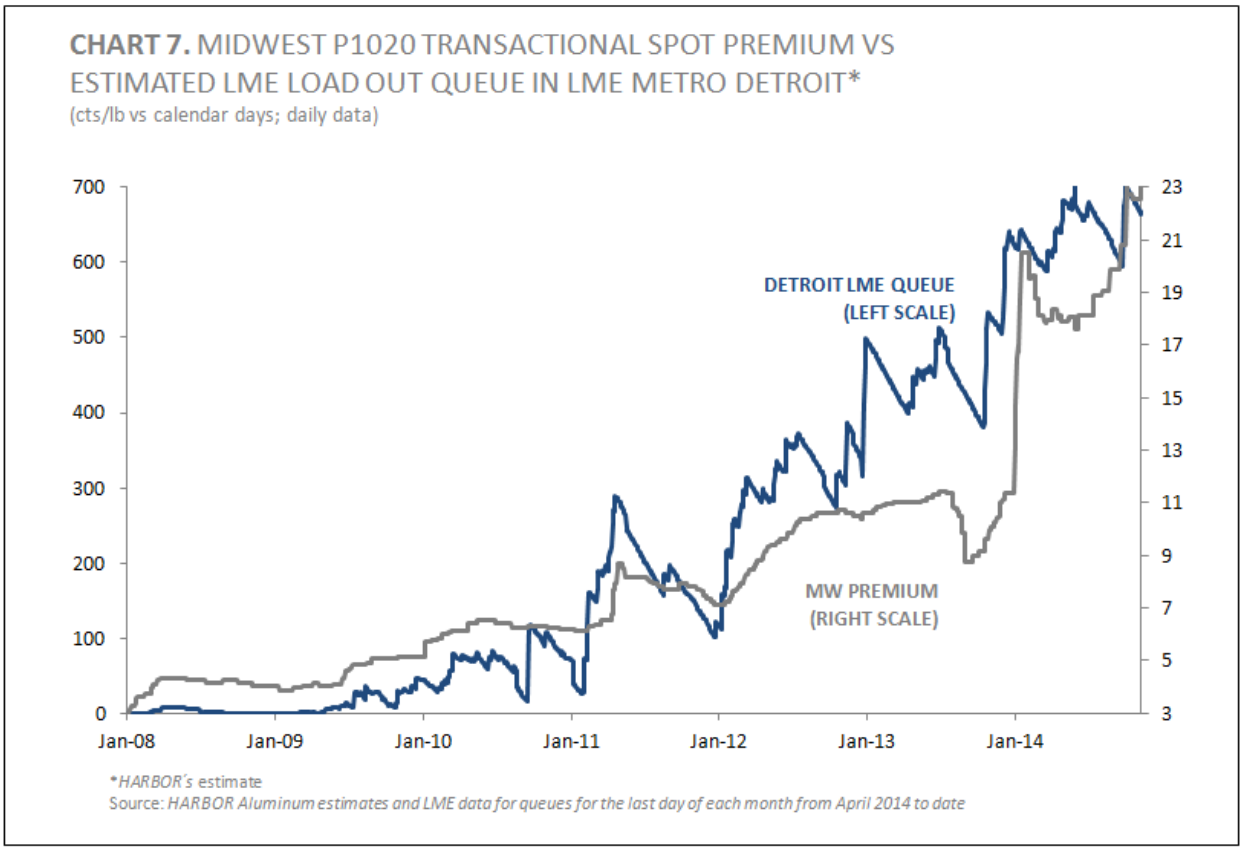


Source: *HARBOR Aluminum*

*Includes costs such as storage, load-out/load-in, total freight, finance cost. It also includes a credit obtained by market contango when sourcing metal out of the LME.

Indeed, HARBOR's mathematical studies confirm that the lengthening of the queue in LME Detroit (*Metro*) has been the main driver behind the unprecedented increase in Midwest premiums. Our work also shows that movements in cancelations/queues in LME Detroit can take as long as 5-7 months before their full impact is felt on market premiums.

Chart 7 below shows how the lengthening of the queue in Detroit from zero to 702 days has impacted market premiums.



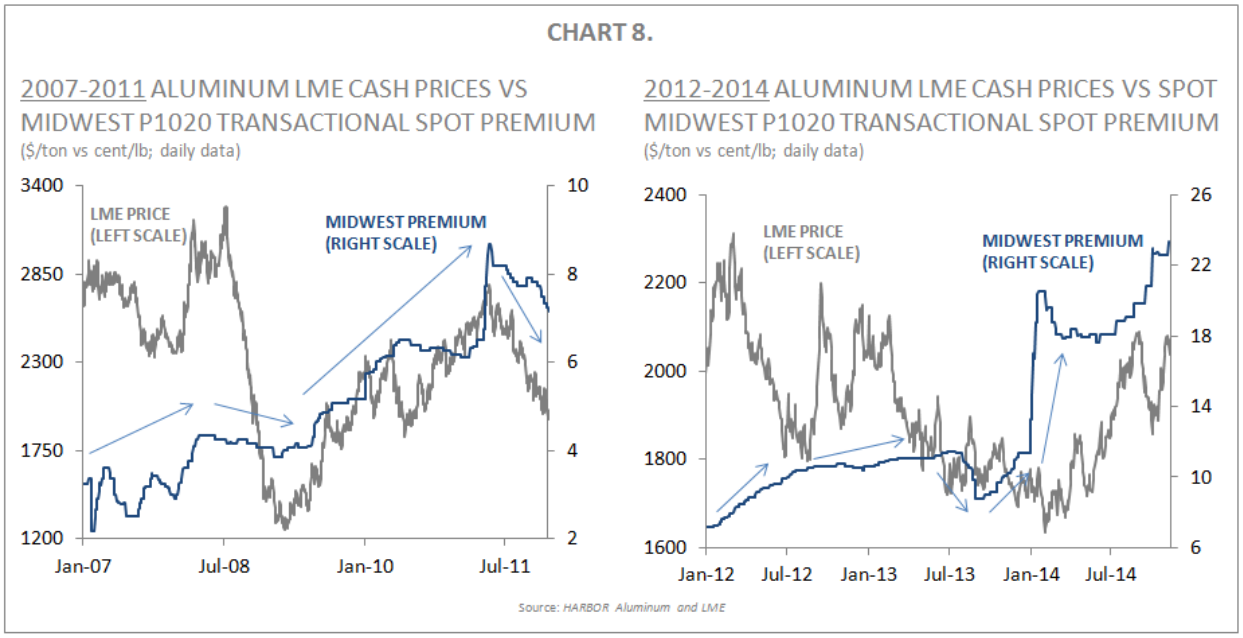
The All-In Price Theory

I am aware of the "all-in price" theory that circulates in the market today. The theory states that the price of an LME warrant is derived from the all-in physical metal price that is established outside the Exchange, such that any artificial rise in market premiums is offset by a discount in the price of an LME warrant (LME price).

I have not seen any serious analyses or empirical evidence that supports this theory. In my view, this notion has a logical conceptual explanation, but does not reflect how the physical aluminum market actually works. On the contrary, evidence that I have analyzed at HARBOR indicates that LME price and market premiums (Midwest premium included) have historically moved together in the same direction most of the time (reflecting demand trends and the economic cycle), not in opposite directions.

LME prices are determined day-to-day by the interplay of financial and physical demand that takes place in the Exchange. The physical market first references its base price from the LME price and then adds the physical premium that buyers and sellers negotiate outside the Exchange.

Chart 8 below shows the day-to-day relationship between LME prices and Midwest premiums.



5. The impact of warehouse queues on the aluminum market generally and on consumer prices, the ability of consumers to hedge aluminum-related price risks, and the role of the LME as a market of last resort

As explained, HARBOR's empirical work and experience is consistent with the idea that there is causality that links load-out queue length (cost of sourcing metal from the LME which is the ultimate "backup" of the buyer) and premiums. In the case of North America, this means a link between the load-out queue in Detroit (*Metro*) and the Midwest premium. It is thus my conclusion that cancelled warrants and the lengthening of queues in Detroit are the main drivers behind today's unprecedented Midwest premiums.

Higher premiums negatively impact end-users financially. Considering the evolution of the full logistical cost of sourcing metal from Russia and the Middle East to the US Midwest region, HARBOR estimates that the effect of lengthening queues in market premiums has cost the US consumer an accumulated sum of at least $3.5 Billion USD since 2011. This estimate considers primary and scrap aluminum consumption volumes in the US, and assumes scrap prices have 50 percent elasticity to changes in the Midwest premium.

End-users cannot effectively hedge against Midwest premium variations because the derivative market is neither liquid nor transparent enough for them to hedge properly. Historically, hedging was not a problem because the premium had (compared with the LME price) either remained static or was subject to very marginal increases and/or decreases. Through the end of 2010, Midwest premiums traded mainly between 2-7 cent/lb and averaged between 2-8 percent of the all-in price (LME+ Midwest premium). Today, the Midwest premium stands between 23.0-24.0 cent/lb, which represents slightly more than 20 percent of the all-in price of aluminum. Consumers have been complaining in public about the increased prices they are paying. Their complaints explicitly target queues and the effect of those queues on market premiums.

Talking with numerous aluminum end-users that are HARBOR's clients, I estimate that more than 80 percent of them don't or can't hedge market premiums. The other 20 percent who do hedge do so for only a portion of their metal needs, and usually for only one or two quarters out (a result of illiquidity, lack of transparency, and the prevailing uncertainty of where premiums are headed). Market liquidity is improving somewhat with the emergence of derivative products such as those offered by the *Chicago Mercantile Exchange* (*Aluminum MW US Transaction Premium* and *North American Aluminum Futures Contract*). However, it remains to be seen how successful these new contracts will be in providing the much needed liquidity to the market.

6. Warehouse transactions where an incentive is paid to a warehouse customer to wait in the queue and ship large amounts of aluminum out of one warehouse and into another warehouse owned by the same company in the same city

As explained above, paying warehouse incentives to attract metal is a standard and historical practice in the LME warehousing business. What is certainly not a common practice, however, is when LME warehouse operators offer and pay an incentive to warehouse customers to cancel metal and wait in the queue. That practice poses a serious conflict of interest because incentivizing the lengthening of load-out queues can materially impact market prices (Midwest premium).

7. Warehouse transactions that link warehouse revenues to the market price for aluminum

To my knowledge, it has never been a standard practice in the LME warehousing business to link warehouse revenues (rent, FOT, penalties for breaking a warehouse deal, etc.) to a market price of aluminum such as physical market premium. Again, this could pose a conflict of interest for the warehouse, especially when the link has the effect of indirectly trading market premiums.