

Seeking Alpha^α

As Time Goes By - China, Inc. Versus The Global Memory Industry

Jan. 5, 2017 11:30 AM ET43 comments

by: William Tidwell

Summary

- China's Predatory Mercantilism is a potential threat to the memory industry.
- The DRAM and NAND markets are likely to have divergent threats.
- A scenario is analyzed assuming China's entry into the NAND market.

"The difference between stupidity and genius is that genius has its limits." - Albert Einstein

"I'm no good at being noble, but it doesn't take much to see that the problems of three little people don't amount to a hill of beans in this crazy world. Someday you'll understand that." - "Casablanca", 1942 - (screenplay by J. Epstein, P. Epstein, and H. Koch)

Once and awhile it seems like certain things happen that really upset your mental appplecart and make it hard to regain your bearings in their aftermath - as if a flash bang grenade went off nearby and you are momentarily robbed of the ability to think straight. Any news associated with the topic of China, Inc. entering the memory business seems to engender this same effect on the stock market. One perfect example of this occurred recently when Mark Durcan of Micron (NASDAQ:MU) responded to a question at the recent Micron-Inotera merger closure ceremony in Taiwan. Asked about the specter of potential over-supply rising from Chinese intentions to build a massive memory industry Durcan said the following:

"It's possible if [China spends] the money that they say they are capable of spending [\$150B], that they can create oversupply," Durcan told reporters in Taipei. "Is it a concern or something to think about? Absolutely."

I don't know about you but I am so glad we got that cleared up. I'm sure that we are all four square in agreement that an asteroid the size of the moon - upon Earth contact - would definitely blow the crap out of everything. Next question?

Now, as much as we all might wish that Durcan had answered that question more gracefully, it's obvious that news about the Chinese intent to enter the semiconductor business is not going to go away. Micron and WDC dropped roughly 3% that day, an entirely predictable result of the comment. The stocks have recovered nicely since then as folks regained their senses and focused on the tight NAND and DRAM markets but it's obvious that this issue is on everyone's mind and there's a lot of fear associated with it. Given even the least hint that China will have the capability of producing memory it's freak-out time - sell everything and run for the hills, folks, the asteroid is coming!

So we know the fear is there. Is this simply mass hysteria or is there something we investors need to be concerned about? If not now, when? Even if China is not a big deal in short term, investors are certainly justified in seeing the China threat as a negative when it comes to the longer view and this in turn could depress industry multiples. As I shall outline below, there is reason to be concerned - China actually **could** be that moon-sized asteroid - but not anytime soon and not in the way that most folks think.

Like most things in this crazy modern world this issue is messy and complicated - there are opportunities and risks - puts and takes - so let's all calm down, take a deep breath and sort out where we are now and where we're headed with China. In so doing there is one thing that is absolutely paramount that we have to understand. The semiconductor memory industry is just one small component of the problem space and there are numerous questions that relate to the timing and tactics of the overall Chinese approach to world trade and the global response to it that will have an outsized impact on the magnitude of the potential impact. Note that I said "global" response. This is political, folks, and entirely beyond the capability of any company, group of companies, or industry to resolve on their own. That is not to say that there is not a vital role for the memory companies or the semiconductor industry as a whole but it does mean that they can't solve the problem on their own. Here's why.

I have written before about the motives, strategy, and outcome of the Chinese entering the memory business and any of you that have read those pieces know full well where I stand on this issue. For those of you that haven't, here's the short course:

The most vital thing to understand is that China's strategy is defined and directed by the Communist Party of China (CPC). It is, in other words, a State initiative, conceived to accomplish State strategic purposes. It is most of all a political initiative designed to enhance and project Chinese power. It is not in any way a product of conventional business strategic thinking. Because this is the case, conventional measures of business success or failure like return on capital or profitability have little or no significance. As any

investor or observer of the semiconductor memory industry knows, the whole question is in economic terms completely irrational. But the Party is insistent and has made this one of their top goals. Why?

Originating as one of the elements of the 2006 CPC policy titled "Indigenous Innovation", the roots of the initiative are in a nakedly mercantilistic economic policy that has been at work over the last thirty years. The same people that brought you massive over supply and the attendant global dislocations in aluminum, steel, LED's, and solar panels look at the world and say to themselves - why wouldn't the same approach work with semiconductors?

While the goal of the effort is to build a globally competitive semiconductor industry in China by 2030, the broader implications of China's effort are ominous. As the recent 2016 ITA Semiconductors Top Markets Report states it:

"[...] discriminatory policies implemented to support its industry to become self-sufficient pose a real long-term threat to not only U.S. firms but the entire global semiconductor ecosystem."

What are these discriminatory policies? Here's Rob Atkinson of the Information Technology and Innovation Foundation discussing just a few of the bigger ones:

"China has for years aggressively threatened foreign competitors with serious penalties, up to and including exclusion from the Chinese market, unless they hand over valuable intellectual property (IP). It has pumped up its tech enterprises with massive subsidies. And it has erected a vast array of contorted rules and regulations inside its borders in a quest to skew the terms of competition and gain absolute advantage in key industry sectors ranging from semiconductors to biotechnology."

Atkinson's list is bad enough but it is just the beginning of the gauntlet US companies must run to compete in the Chinese market. Other obstacles of note include China's phony patent law, flouting of IP licensing standards up to and including outright IP theft, and parochial Chinese "standards" in contravention of established and more robust standards (Exhibit A being the Chinese "LTE"). Whatever the exact methods it is clear where China's initiative leaves the global memory industry. Here's US Commerce Secretary Penny Pritzker giving her take on China's chip initiative in a November 2 speech.

"[The Chinese plan to invest \$150B in semiconductor capabilities...] would be equivalent to half of worldwide semiconductor sales last year and result in market distortions similar to those plaguing the steel, aluminum and green technology industries [...] The world has seen the effects of this type of targeted, government-led interference before [...] The result has been overcapacity in the global marketplace that has artificially reduced prices, cost jobs in both the United States and around the world, and caused significant damage to those industries globally," [...] Pritzker speech - Center for Strategic Studies, November 2, 2016

But why the memory business, specifically? The question has been asked and answered in the industries Pritzker mentioned in her speech. Steel, aluminum, green tech (solar cells) - what do they have in common? Answer: They are commodity-like products that are foundational and/or transformational. In other words, once you control the worldwide market for those products, you can build massive volume and support-industry scale to drive market domination initiatives across the entire tech-industry value chain. In the new "memory-centric" computing model semiconductor memory is the key pillar that supports much of the upstream value chain. Long-term, Chinese domination of the memory industry would be a direct threat to non-Chinese companies dependent on access to this critical technology. Short term, there can be no doubt about the effect of Chinese success with this policy: China's entry into the memory business would result in catastrophic shareholder losses that are a direct consequence of the massive oversupply condition that would result from China's attempt to dominate the industry. Not only that, but the attendant destruction of shareholders assets would spread far beyond the memory business.

So yeah, this Chinese policy is indeed a moon-sized asteroid. There are existential issues at stake here. But can they really do it? How would it happen? When? These are serious questions that have yet to be answered. It is clear that the memory industry Oligarchs don't believe they can - not anytime within this decade at any rate and certainly not with the current generation of memory - meaning DRAM and NAND. I believe they are right. But don't take my word for it. Here's Siva Sivaram, EVP of Technology of Western Digital (NYSE:WDC), assessing Chinese NAND capabilities in the recent WDC Investor's Day Meeting during the Q&A:

[Their] "stated roadmap is multiple generations behind where we are in the industry in terms of when the technology is planned to be productized... [...] They are 2D [...but ...] there's a stated goal of getting to 3D NAND [on their roadmaps]. As you can see we are on a cadence of 18 months for new generations of BiCS.[...] As we move further, [...] they fall further behind, leaving a large gap where the technologies are productized. [...] It's a tough mountain to climb." - [authors transcription and emphasis] - WDC Investor Meeting - SA Transcripts

This statement is completely congruent with past remarks by Micron (Durcan, DeBoer, and Maddock) that place the entry of China late in this decade, if then, and even then with an inferior product that is two to four generations behind the current industry standard. Clearly, the key to the game is IP - the Oligarchs have it - China does not.

If there is to be a legitimate Chinese threat to the incumbents China must get it. But how? If you have been following this issue over than last year or so you can read numerous articles that opine that some sort of "joint venture" is possible with Micron being the likely candidate. This is a fantasy. The oligarchs aren't going to give IP to China or deal it away, Micron included. The memory industry companies, especially Micron, know all too well (from years of bitter experience) what the implications are of irresponsible State capital at work in their business. The other key thing to remember is that even if one of the industry companies was stupid or desperate enough (Toshiba?) to license IP, there is a robust legal framework that would prevent such a transfer. (I'm not going to discuss the details but I have explored this issue thoroughly in this article, and I encourage you to read it.) Finally, above and beyond either the factors of industry self-interest and legal prohibitions regarding IP transfer, there is the most important factor of all, which is political.

Donald J. Trump is two weeks away from being the 45th President of the United States. There is not a snowball's chance in hell that a Trump administration is going to allow strategic IP sale or transfer - via outright M&A or any other mechanism such as a "joint venture" - during the term of his Presidency. (If you want to get a flavor of where things are going read the recent NY Times article on Robert Lighthizer, Trump's nominee to be the next US Trade Representative.)

So we have these robust barriers for "legal" transfer but the paranoid among you may well say but what about illegal methods of obtaining the IP? Could China steal it? The answer of course is yes. Much like SK Hynix (OTC:HXSCF) did with Toshiba (OTCPK:TOSBF), China can (and will) hire away managerial, process and engineering talent from the incumbents who may or may not bring proprietary IP with them. In many ways, however,

this is only half the battle, and maybe less than that. Using a baseball analogy, you may steal a sign and know that Nolan Ryan is throwing you a fastball. Know that and hitting it are two totally different things. Modern semiconductor manufacturing is an ensemble effort requiring sustained collaborative effort throughout a dauntingly long and subtlety complex recipe chain of numerous steps, all of which must be done exactly right for the final product to be usable. China will, over time - lots of time - develop this process knowledge but we are talking years, not months, for this to happen.

The bottom line for concerned investors is this: China will not have a competitive DRAM or NAND product this decade. Will they in the 2020's? DRAM will be the easiest target because the glacial pace of process advance. Current thinking is that DRAM scaling is coming to an end with maybe only two more nodes that would be usefully produced. So China can eventually catch up in DRAM, but why would they? The new memories on the horizon show the promise of taking big chunks of DRAM market share as the 20's advance. Why would even an economically irrational China want the piece of a potentially rapidly declining market?

NAND on the other hand is a more interesting question. Obviously WDC doesn't think they can catch up, but even if they can't - do they have to? Let's project a scenario that has the other NAND producers 2 - 3 nodes ahead of China in 2022. That should equate a to 30 to 50% cost advantage and with that die density advantage comes reduced power usage and better performance and packaging flexibility. So why would a user buy the Chinese product? Niche markets could always be found for some of their product but China needs massive scale. China Inc. could discount its chips enough to make them attractive but it would take horrendous losses doing so. That being said, when has that ever stopped them? So it is certainly possible we could see a large supply of Chinese NAND on the market. It's also conceivable that China's \$150B fund could bring as many wafers on to the market as the rest of the industry combined - by that time that would be roughly 1 million wpm, which because of their presumed density disadvantage, would equate to 500 - 700k wpm for the incumbents in bits. Is this necessarily a negative for the other NAND companies? Maybe not. As I have argued in a past article, by that time the world may well need the increased supply. My analysis shows a 2 ZB deficit (that's 2 Billion TB) in 2020 just to meet the storage needs for analyzing the "target rich" data being produced. Given the process standards likely at the time (a 1536 Gb TLC die of 128 layers), over 40 new fabs costing \$350B in CapEx would be needed to meet that magnitude of user demand. Netting it out, China's \$150B of CapEx may buy them a lot of fabs but even that level of investment may not be enough to meet demand.

Personally I think that NAND has reached the tipping point and that this is a likely outcome because of exploding demand growth rates. In this scenario China, Inc. is basically subsidizing the storage users of the world by allowing them to buy NAND that they otherwise would not be able to. The other aspect to this scenario is the impact of the new memories. Right now it is clear that DRAM will be affected but what about NAND? It is possible that the "ideal" all-purpose memory comes to market by say, 2025, but even so how much production scale would exist at that time? We know the computing model is changing to utilize the new NVM memories but it seems unlikely to diminish the need for gigantic amounts of storage, and that's the province of NAND.

The larger question in all this rumination is what can China do in the next generation non-volatile memory market? Various flavors of resistive RAM (ReRAM) will be coming to market as the 20's advance, and this would seem to be the ideal point of entry for a truly innovative Chinese producer. If China truly wanted to play by the rules in international technology trade this would be the strategic move that made the most sense in terms of providing a true economic return. This may even be the one area where an M&A strategy for acquiring early-stage memory IP might be allowed.

Boiling it all down from a parochial perspective, Micron, Intel (NASDAQ:INTC), and WDC (the US memory industry) have the will and the tools (legal and political) to thwart the Chinese. If you believe as I do that NAND demand will absorb any extra capacity (even if the product is archaic and heavily subsidized) then I have painted a rosy scenario through at least the mid-2020's. If you doubt NAND demand then maybe you could posit a negative impact on the industry that develops after the turn of the decade. Take your pick. Either way there is absolutely nothing a reasonably prudent investor should worry about for some time to come - well beyond most investing horizons.

So there's nothing to worry about, right? Well, no.

Unfortunately, the real risks to the Micron's of the world have nothing to do with China's semiconductor initiative per se. To see those risks we have to lift our eyes from the memory industry's trees to global trade's forest. It is in that larger view that we will see the true shape and scope of the emerging great power - China - and its threat to global peace and prosperity. WW III? No, but resolution will not come fast or easy and even the largest companies and industries will merely be pawns in the outcome. The real question is this. How can the US lead a global response to China that challenges the Chinese strategy of naked, predatory mercantilism in such a way that needed changes occur?

My next article will explore that larger question. Happy New Year.

Disclosure: I am/we are long MU, WDC.

I wrote this article myself, and it expresses my own opinions. I am not receiving compensation for it (other than from Seeking Alpha). I have no business relationship with any company whose stock is mentioned in this article.

Editor's Note: This article discusses one or more securities that do not trade on a major U.S. exchange. Please be aware of the risks associated with these stocks.

Comments (43)

KYSANMAN

thanks for another great contribution Bill!

05 Jan 2017, 12:27 PM

GAlan

WT, Thanks for another well written and researched article.

The biggest worry as you say is the possible trade war that may erupt with our new president's policies and China's retaliation. If it occurs all markets and equities are at risk.

05 Jan 2017, 01:02 PM

danirak

GAlan,

You afraid of China's retaliation, what is about China' domination in economic and political sphere of our life? If nobody stops them now tomorrow it will be too late.

05 Jan 2017, 01:12 PM

GAlan

My worry is about the markets and esp. MU's share price at this point in time.

05 Jan 2017, 03:20 PM

GAlan

Plus economic disruption, recession, job losses etc. around the world. All of which could be reduced with a modicum of diplomacy which is not evident in the incoming administration.

05 Jan 2017, 03:28 PM

William Tidwell, Contributor

Author's reply » Galan and danirak,

You guys have put your finger on it. This is a "pay me now or pay me later" issue with no perfect answer. As I shall argue, the memory companies are in the best and strongest position vis-a-vis China specifically because China has no substitute for what they sell. There would have to be an anti-trust exemption to fully empower them. That is one thing (among a number of other actions) that the new administration may do to help American companies gain leverage. Companies like Samsung (non-memory divisions) , Ford, GM, Apple and Boeing are the most vulnerable to the tit for tat retaliation strategies that will likely be employed.

05 Jan 2017, 03:33 PM

danirak

I don't hold my breath for incoming administration but all previous administrations just gave the farm away to China.

05 Jan 2017, 03:59 PM

ScareCrow5a

Thank you danirak! I want you in my foxhole!

06 Jan 2017, 03:47 PM

DonInSanDiego

Very interesting article. Much to ponder. Thanks!

05 Jan 2017, 02:29 PM

knowledge helps!

Great article, thanks a lot. China also needs the U.S. , but it will indeed be a fascinating period ahead of us. Long MU and Deutsche Bank (that's my expertise, I think 🇺🇸).

05 Jan 2017, 02:41 PM

William Tidwell, Contributor

Author's reply » knowledge,

You're right - China does need the US - we are interdependent with each other and hopefully that fact will pull us through what is likely to be a long period of ongoing conflict and cooperation.

05 Jan 2017, 03:36 PM

Rick39

Thanks for writing this. It certainly has made me aware of an issue that I was not aware of as a MU investor and past WDC owner.

If our big3 are so far ahead of China, what is the chance that some of this technology could be stolen? I have heard of agents planted in US companies in the past. Could they steal the necessary knowledge with

a combination of spies, bribes, hacks, combined with industry security sloppiness?

05 Jan 2017, 06:19 PM

Robert Castellano, Contributor

"So it is certainly possible we could see a large supply of Chinese NAND on the market. It's also conceivable that China's \$150B fund could bring as many wafers on to the market as the rest of the industry combined - by that time that would be roughly 1 million wpm, which because of their presumed density disadvantage, would equate to 500 - 700k wpm for the incumbents in bits. Is this necessarily a negative for the other NAND companies? Maybe not." Agreed. But China has a tendency to disrupt current technologies to the extent that it can not only meet demand deficits, but knock out the competition. I discussed that in a SA article <http://seekingalpha.co...>

05 Jan 2017, 06:57 PM

William Tidwell, Contributor

Author's reply » Robert,

Of course you are right about their practices in other markets. The interesting question with memory is how far they would be willing to subsidize archaic (and expensive!) tech nodes. Of course they could do anything up and including giving product away but that extreme level of a nakedly predatory policy would amount to an economic WWII that would draw a strong US and world response. It's unthinkable to me that it could get that bad but we're all speculating here...

06 Jan 2017, 10:50 AM

danirak

William,

Can you recall for last thirty years strong US and world response toward China economic and political policies? US always was concerned about retaliation from China.

06 Jan 2017, 11:53 AM

William Tidwell, Contributor

Author's reply » danirak,

The US has acted through the WTO on a case by case basis - steel and aluminum and LED dumping cases have been filed and won. This issue has evolved slowly, however, and only in the last 4 or 5 years has it become clear that the Party is not going to meet their obligations under WTO. So now is the time to take this to the next level.

06 Jan 2017, 02:39 PM

The Bluesterman

Thanks for the nod to Casablanca, Bill.

Your article reminded me of how this might play out where the scene portraying the resolution of the rights to IP question could have dialogue from another great Bogie film filled in.

Rest of the world to China: "If you're the police, where are your badges?"

China, responding to the world's challenge: "Badges? We ain't got no badges. We don't need no badges. I don't have to show you any stinking badges!"

Peace to all,

Blue

06 Jan 2017, 08:31 AM

William Tidwell, Contributor

Author's reply » Blue,

Very good! your ever fertile mind never ceases to amuse (and amaze). ;>)

06 Jan 2017, 10:35 AM

t9256ss

Well written and thought out. Thank you.

06 Jan 2017, 09:24 AM

Yatagarasu

45, William. 35 came to an untimely and controversial end. Will assume that slip isn't due to nefarious Manchurian programming. Otherwise, nice article.

Y

06 Jan 2017, 09:46 AM

William Tidwell, Contributor

Author's reply » Yatagarasu,

Thanks. You're right - fat fingers at work with the "35" reference. I'll fix that.

06 Jan 2017, 10:42 AM

ScareCrow5a

Mr Tidwell,

Huge big thanks for this article! Your insight, understanding and expert explanations of State controlled (CPC), particularly the Chinese, should be mandatory reading for Trump, his administration, American HS & College curriculums and especially so called Global Economy Pushers. This article of yours really helps us see more in depth how all this is playing out in the semi industry. Seriously, just because Trump is the ultimate capitalist, makes great deals, etc., this doesn't mean he isn't susceptible to following into a number of ominous state player traps. First of all - greed. Second of all - the all American Spirit of helping others & foolishly trusting them to do reciprocate in kind. State run players like China, Russia, N. Korea, Iran, etc. are not humanly capable of playing nice in a 'global' sandbox with the West and/or Judaeo Christian nations. They either see us as fools or infidels or just outright chumps!

China wants to own specific industries and CONTROL them Globally. The West certainly doesn't need to own everything, or even just semis, but we sure as heck better protect what we've created or see it taken from us! Global Economy pushers do not subscribe to this and will take America to the brink of extinction before they figure out their mistake! A good analogy was Hillary's 'Reset Button' with Russia, ha! Right out of Obama & George Soros playbook. With Trump we have a chance of turning our country and it's industries around. America doesn't stay an exceptional by giving it's American pride away for free or letting it get stolen.

06 Jan 2017, 03:25 PM

H. Bruce Campbell, Contributor

Great information, deductions, and perspectives as usual William, thanks so much!

An additional worry of course is acceleration of serious friction between the PRC and other nations. The Trump factor probably increases the chances of a serious incident with PRC in the South China Sea or elsewhere. So the vulnerability of Intel's Dalian facility might be debated in these halls again.

Just strictly speculating, one of my nightmare sequences is:

1. AI technology, which is storage intensive, continues to advance exponentially and demonstrates progress milestones which convince sovereign nation power brokers that AI strength will quickly become a top tier weapons effectiveness factor (and ultimately the dominant factor).
2. In response to a serious incident, or simply a heated atmosphere with openly expressed intransigent posturing by both sides, the PRC deduces that it can't delay acquisition of all the elements of AI technology it requires to continue to close the military gap with adversaries. So it abruptly and strictly nationalizes Intel's Dalian fabrication facility, thus acquiring immediate state of the art 3D NAND technology and fabrication capacity, eradicating all the delays William so expertly described in his fine article (assuming a continuing supply of all necessary raw materials can be secured too). BiCS in Wuxi might be acquired in the same manner, as might V-NAND in Xi'an.

Micron has no fabrication facility on PRC soil, nor (I assume) NAND fabrication on ROC soil. But of course their hard won 3D NAND technology is on China's soil 'courtesy' of Intel, so Micron's vulnerable too.

The bottom line is that all three state of the art technologies are on China's soil. So if sovereign state posturing become seriously heated the PRC has both threat leverage (implicit or explicit), and, should bullets begin to fly, outright acquisition capability. Threats alone, even if only implicit, provide very powerful leverage for the PRC - nobody could simply discount a nationalization possibility.

Doing so would be very costly to the PRC though of course. Dominance of some industry sectors notwithstanding, it would suffer substantially if important international business relations collapse, a substantial restraining factor to threats or actual nationalization. But the PRC's government seems highly determined to pursue its expansionist goals, and my sense is that they seek to minimize that restraint in every industry it views as important to those goals. If largely successful it could reach a point where it could afford to nationalize an important facility, thus instantly scuttling many very important business relationships, but in trade for essentially delay free outright acquisition of an important technology.

Rapid advancement of AI could significantly affect the timing of such a tipping point. AI intensive weapons seem likely to become so potent that they'll remind us of the sudden destructive power leap which occurred when nuclear

weapons rather abruptly entered the warfare equation.

It's a more difficult transition to perceive - the dramatic step from a conventional bomb to a nuclear bomb is rather obvious. But the step from current technology weapons to advanced AI weapons isn't as easy to understand as a simple leap in explosive power. But weapon effectiveness involves far more than explosive magnitude, and often doesn't involve explosives at all. Sufficiently brilliant weapons could render an entire sovereign state utterly dysfunctional almost instantly - they could infiltrate, disrupt, cause total chaos, and even destroy all the mechanics and processes of a nation very quickly and with high stealth.

Such weapons don't exist now, at least in a full array form, but advancing AI will lead to them. To the extent belligerents perceive this they'll strive to possess the most brilliant AI on the planet.

And AI is highly storage intensive. And the best AI will incorporate the highest performance storage available. Which in my personal view is currently 3D XPoint followed by 3D NAND. (I personally judge BiCS and V-NAND as likely to fall technically behind 3D NAND, but that remains to be seen.)

Implications to the contrary notwithstanding I doubt 3D XPoint will be fabricated on PRC soil in the foreseeable future - I doubt even the Obama administration would have allowed it, and that the Trump administration will be more strict about the matter.

And I worry that Intel may have misjudged the risk of expanding in the PRC. The PRC remains highly dependent on reasonably reliable international business relationships. But it seems to me to be striving toward a high level of self reliance - an ability to proceed with a smaller group of partners even in a conflict. The tension between the PRC and certain other states is rising. And I view AI technology exponentiation as a powerful wildcard which renders future events unusually difficult to predict. (The PRC's desire to acquire the ROC is a rather unique and potentially potent wildcard as well.)

Economically compelling though it may have been, I fear events might render Intel's decision to expand substantially in the PRC unwise. And, in the context of my worst case wild paranoia speculation, I wonder whether a dramatic AI advancement combined with very high tensions might lead US power brokers to secretly demand that Intel effectively abandon their entire Dalian facility, removing software, records, and whatever other 3D NAND fabrication assets they can in the process. (An impossible task, but such a demand might be made anyway.) If an AI advancement reminds military strategists of the leap from conventional to nuclear power, such an event isn't inconceivable.

Just as you stated in your article opening, events can happen so quickly that they qualify as shocking. Such events occur in our personal lives - perhaps we should perceive some life changing (or ending) events coming, but usually we don't - we tend to assume all will proceed as it has in so many years past. A bad diagnosis is but one of many reminders that the only constant is change. And international affairs are of similar character. The PRC's saber rattling, militarization of the South China Sea, and expansionist behavior in general is like an odd abdominal sensation or an unusual looking skin lesion. They're disturbing but we tend to assume they won't lead to anything dire - that they'll be manageable just as most things in life are. But not all - some initially modest looking glitches grow into terrible problems which simply can't be resolved sans considerable sacrifice, or even at all. And therein lies a risk of fabrication of critical AI technology on PRC soil.

And if tensions with the PRC accelerate it seems likely that the investment community will raise the risk element of Intel appraisals. Maybe Micron too since they're obliquely vulnerable.

Nonetheless, highly concentrated Micron and Intel calls. And this critical contrast between PRC and U.S. global hegemony tactics might suggest that my fears about potentially dramatic PRC actions are unfounded: <http://bit.ly/2iL3pUt> (And presumably Intel judges my fears as unrealistic as well.) And this, starting at "China's Pipelineistan "War"" at <http://bit.ly/2iNh6Af>, though dated is an interesting snippet about energy logistics in the region. Though I read these, I'm not a student of the issues and thus can't judge their overall quality or objectivity, except to say that I think the StateOfNature.org article overlooks, perhaps simply because it considers them off subject, some PRC conduct shortcomings. Also I assume that article was composed prior to the PRC's installation of weapons in the South China Sea, a very important development.

In any case bear in mind that I make many mistakes, including some whoppers. So steer your own ship please.

06 Jan 2017, 06:00 PM

William Tidwell, Contributor

Author's reply » HBC,

You're right - there are some truly ugly scenarios out there if things start going south. Regarding "weaponizing AI", I think you're right about the potential impact. I don't doubt that the US will win that race - we spend a factor of 3 more than China on our "Defense" budget. What that means for the future of mankind is very sobering indeed. Nevertheless, I'm an optimist, all that stuff is bad for business and hopefully common sense and good judgement will win out.

08 Jan 2017, 06:59 AM

H. Bruce Campbell, Contributor

Absolutely agree in every regard William! May bullets never fly - they're horrible for constructive hearted business and devastatingly tragic for the utterly innocent (<http://bit.ly/2iRzo3l>).

And great stuff as usual - you're an attentive investor's Cosmic Treasure!

08 Jan 2017, 08:51 AM

i_am_seeker_2

"They say there's no devil, Jim. But there is. I've seen it."

<http://amzn.to/2iRdwqS>

Don't know if people who don't have Amazon prime can watch this. But if not, search for "Star Trek: Doomsday Machine". It can be watched on various web sites, including Hulu. Unhappily, rationality cannot be depended on. There are faux rationalities in many guises, including some brilliant ones.

08 Jan 2017, 09:12 AM

William Tidwell, Contributor

Author's reply » seeker,

I agree, but its all we've got. One of the positives is that Xi knows us well. He went to college in the US - in Iowa. Another item we need to remember is that the CPC is interested ultimately in one thing and one thing only - its own survival. They are riding the Tiger and they know it. They simply can't withstand a long period of economic decline so that gives us leverage.

08 Jan 2017, 01:18 PM

William Tidwell, Contributor

Author's reply » Folks,

Obviously this topic is top of mind for the SemiC industry. Note the recently released report from the President's Council on Science and Technology has just published their report focusing on this very issue of Chinese innovation mercantilism. Here's the link:

<http://bit.ly/2iNex3h>

good stuff...

07 Jan 2017, 09:03 AM

ScareCrow5a

The timing of the Pres Council Sci & Tech article and our identical topic/discussions here on SA was a real 'Twilight Zone' moment! Just a coincidence?

08 Jan 2017, 04:20 PM

H. Bruce Campbell, Contributor

Reviewing my concerns as best I understand matters:

All three state of the art NAND storage technologies are being fabricated on PRC soil. In any confrontational situation that reality gives the PRC posturing or even threat leverage.

Missing from that vulnerability is Western Digital / Toshiba's most advanced BiCS since that alliance has no facilities on PRC soil to my knowledge (my sense is that their fabrication facilities are safely concentrated in Yokkaichi, Nippon). S.K. Hynix fabricates BiCS in Wuxi but it's not the same BiCS - I suspect Western Digital / Toshiba's BiCS is now more advanced. But I suspect S.K. Hynix BiCS, originally acquired from Toshiba by theft, is relatively close in overall performance.

Micron has no facilities on PRC soil, but their superb 3D NAND technology is being fabricated by Intel at their Dalian facility, so it's vulnerable as posturing leverage or worse too.

3D XPoint is not being fabricated on PRC soil at this time, and in my estimation it never will be - I think it extremely unlikely CFIUS will allow it under any administration, and especially under the Trump administration. In my opinion essentially everyone, including the PRC, fully recognizes this.

That does not guarantee the PRC won't acquire 3D XPoint technology of course. Presumably Western Digital / Toshiba is frustrated that their BiCS technology landed on PRC soil in spite of the fact that they avoided fabrication facility deals with the PRC. Speculating, they rejected PRC facility subsidy offers and China market access lures so

as to insure the security of their technology (wisely so in my opinion). Yet it ended up on PRC soil anyway due to overt theft of BiCS by S.K. Hynix. It's very difficult to protect unique technology...

And finally I view storage technology as the most crucial key to AI technology. And I view AI technology as advancing rapidly on all fronts, including weapons systems, where I believe it will become the most dominant differentiator in weapons technology relatively soon.

All sovereign states which engage in uncivilized mercantile behavior are stirring a very dangerous pot, especially with the following elements at play:

1. AI Technology approaching the birth of conscious sentient machines, at least some of which will become brilliant far beyond the reach of any biology based life form.
2. An evidently reactionary president of the most militarily powerful (but in decline and frustrated) nation on earth.
3. Expansionist and illicit mercantile behavior by a rising hegemony, including militarization of international waters in the South China Sea.

Countering these dangers are deep economic interdependencies involving a great deal of international capital which flows in a somewhat borderless global ocean of commerce.

The question is whether international capital is enough to arrest growing tensions. I suspect not based upon current trends, but obviously I hope I misjudge. The balance might be tipped in favor of peace if global corporations can reasonably leverage the power of their capital sufficiently to discourage illicit mercantile behavior. That won't be easy - they may have to act against their short to moderate term self interests to do so.

Even if illicit mercantile behavior can be reasonably subdued the fate of contested international waters must still be resolved. That won't be easy either, but as I've suggested the ROC might be convinced to play a positive role for peace and freedom of navigation in both South China Sea and East China Sea waters while at the same time reducing risks to their sovereign autonomy - if they and the US can mutually pursue those goals with very patient tenacity.

None of this will be the least bit easy. In the meantime state of the art 3D NAND, V-NAND, and BiCS storage technology is being fabricated on PRC soil...

07 Jan 2017, 07:40 PM

johndkopta

Thank you Mr. Tidwell.

A goodly helping of your wisdom is a nice way to start 2017.

07 Jan 2017, 09:10 PM

ScareCrow5a

Thanks everyone for sharing your knowledge & insights into great discussions of "illicit mercantile behavior". After all, ROC's "illicit mercantile behavior", including S. China Sea bullying, is in summary what the world (not just America) is concerned/worried about. The semi industry is just one of many under threat. I don't see trade agreements, NATO, 'Globalist', or 'Global Economy', as answers to this threat. Just as that hasn't worked in the

middle east, ISIS, Russia, N. Korea, etc., I don't see it working with China either. At least Trump's looking out for America now. So, we've got a chance now...

08 Jan 2017, 04:45 PM

H. Bruce Campbell, Contributor

You meant PRC I presume? (<http://bit.ly/2iSD0SB>)

(And a map of sovereign nation claims to the South China Sea: <http://bit.ly/2iSpsse>. PRC's remarkably aggressive claim evidently wholly envelopes ROC.)

08 Jan 2017, 06:05 PM

Moderation

When I listen to Trump speak, I think something very similar to what you said, except in my case it's "look out, America!" :0

09 Jan 2017, 02:48 AM

ScareCrow5a

PRC Vs ROC? Whichever China controls "S. China Sea bullying". How bout just 'China'?

Thx for the links Mr Campbell. Fascinating! I learned something.

09 Jan 2017, 03:38 PM

Moderation

Mr. Tidwell-your articles are fascinating, especially this one. Thank you.

12 Jan 2017, 02:56 AM

Growlzier

William, truly amazing how far out in front of yourself you can get in these sort of arguments. Now that 67% of Americans think that World War III is likely, your article comes as no surprise. China's government, the Communist Party, will do anything and everything on Earth, Heaven above and Hell below to stay in power - check out the new "Social Credit" program. It is bound to creep you out;

<http://bbc.in/2j1erVL>

China's Communist Party has settled on Realtime Analytics and eventually AI platforms as the main tools to maintain their power base. Economics has nothing to do with this one overriding goal. If the infrastructure companies happen to be able to export the efforts of their work then all's the better...,

12 Jan 2017, 10:44 AM

Retired Securities Attorney, Contributor

The Chinese Communist Party does do some good things for its citizens. A few days ago, an older mother of a friend was visited by a group of party members, all strangers, who delivered 2,000 RMB (about \$288) and a basket of flowers just because.

12 Jan 2017, 11:11 AM

GAian

"forge a public opinion environment that trust-keeping is glorious", warning that the "new system will reward those who report acts of breach of trust".

George Orwell was just a tad early

12 Jan 2017, 12:22 PM

William Tidwell, Contributor

Author's reply » Growlzer,

Thanks. I'm well into my next article on this issue and the one thing that continues to strike me is how thoroughly our leaders, through the last 5 administrations, has failed to appreciate the implications of the Chinese strategy. The Party clearly understands the role that economic power has in supporting strategic political and military objectives. They see a straight line from economic supremacy to global domination in other areas.

And yes, the "SC" initiative is truly Orwellian. And yes, Party preeminence is his sine quo non. Xi has two broad goals and sees them as mutually supportive. 1. Maintain Party supremacy in China, by any means necessary, and 2. Become the preeminent military and economic power in the world. He sees goal number 1 as necessary for attaining goal 2.

12 Jan 2017, 01:04 PM

i_am_seeker_2

Well, perhaps it is inevitable, I don't know. There are certainly political factions within the US that are somewhat analogous to the goal of the Chinese Communist Party, at least w/r/t the international arena. Cf. for example, the Bush Doctrine:

<http://bit.ly/2jbTQht>

And if the Chinese are doing it, then game theory says that we and our allies must do it as well. One of the saner critiques of the Obama admin is that they were too internationalist, too trusting of an international order and the good will of other countries, and thereby set the stage for a more nationalist sounding candidate like Trump (although the critique of Obama got muddled by all of the Islamist BS).

It is hard to see how any of this will end well in the era of nuclear weapons mixed in with various conflicting power circles and ideologies, some of which pre-date Newton and Bacon's revolution.

12 Jan 2017, 01:27 PM

Growlzer

That's the implied creep out factor.

In America it's been made into a brand new industry that performs data mining to remove any anonymity that an individual might have had through deep mining archival data. Any attempt around it just becomes a speed bump in their road till they find a work around.

Just become Superman when giving information - just lie with hopeless abandon. Let your physician be the first to guess your true age, color of eyes, hair...,

13 Jan 2017, 04:33 PM

johndkopta

Interesting little article about what Mr. Xi as "core" leader of the party will be up to this year.

<http://econ.st/2il0e22>

12 Jan 2017, 01:57 PM