

PDV *OBSERVATIONS*

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Wintel 2.0?

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Microsoft's Windows operating system and Intel's microprocessor chips have dominated the personal computer (PC) market for over 20 years. This powerful duo, commonly known as "Wintel," saw their stocks soar along with the industry's explosive growth during the PC era.

The past decade has been less kind to Wintel. After hitting bubble price levels along with many other technology stocks in the early 2000s, the stocks have gone nowhere. In contrast, the earnings and related business value of both companies have continued to grow nicely over that period. The combination of stagnant stock prices and rising earnings has resulted in the most attractive valuation in years for Intel and Microsoft. Currently the stocks are deeply out-of-favor. Is the investment herd unduly pessimistic about Wintel's prospects?

Certain facts do support the bears' case against Microsoft and Intel. The PC industry has drastically slowed over the past several years, as tablets and smartphones have eaten into PC sales. Until recently, global PC unit sales were still growing year over year, so announcing the death of the PC industry is greatly exaggerated. While PC sales have slowed in developed countries, they continue to grow in emerging markets. Further, the enterprise/business PC market remains healthy, with the growth in cloud computing also boosting this segment.

Nevertheless, the deflationary price trend of PCs (as with all technology products), coupled with the smaller enterprise market (relative to the consumer market) and lower profit margins from emerging market sales, do pressure total PC sales. While Wintel continues to make good profits and generate healthy cash flow from its massive existing customer base, Wintel's future appears less promising than its past unless it successfully adapts to the changed market dynamics.

So far, Wintel has achieved limited success selling into these new form factors, because its traditional strengths are not suited for such new devices. Smartphones and tablets require low power usage, long battery life, low heat generation, fast boot-up, and touch-based capabilities. In contrast, Wintel has traditionally excelled at high performance and strong productivity, but at the cost of slow boot-up, hungry power usage, heat generation, and reliance on the mouse/keyboard. That is why most smartphones and tablets in the market today run on an operating system from Apple (iOS) or Google (Android), and chips based on ARM Holdings' designs.

Wintel's limited progress to date has Wall Street writing its obituary. But Wintel is hardly standing still. Indeed, we believe the combination of Wintel's existing technologies and new technologies forthcoming within the next 12-18 months will lead to Wintel's renaissance ("Wintel 2.0"). Contrary to prevailing wisdom, we think Wintel will become increasingly successful selling into a) hybrid PC/convertible tablets ("convertibles"), a form factor that will seriously challenge straight tablets, b) straight tablets; and c) smartphones. This article will discuss the first two -- convertibles and tablets.

Hybrid PCs/Convertible Tablets

To understand why convertibles will seriously challenge tablets, let's examine the pros and cons of tablets versus traditional notebooks. Tablets' popularity comes from their portability, price, and hardware that is optimized for media consumption. Tablets, however, have more limited productivity than notebooks, which are better at content creation. The major pros and cons of the two devices are:

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	Pros	Cons
Tablet	<ul style="list-style-type: none"> • Compact • Lightweight • Cost less than laptops • Lower power consumption and generate less waste heat ^{1,2} • Longer battery life • Use solid-state drives (SSD) – faster access and lower power usage ³ • Boot up faster 	<ul style="list-style-type: none"> • No physical keyboard (but a tablet generally can connect to a physical keyboard) • Limited connectivity (e.g. no USB port, serial port, etc.) and expandability (e.g. no SD card slot) • Limited printing options ⁴ • Less local storage capacity • Can't run desktop applications • Productivity applications available for tablets are scaled down versions ⁵ • Rely heavily on Internet connectivity for cloud based storage and applications
Notebook	<ul style="list-style-type: none"> • Built-in physical keyboard • More connectivity, expandability, and printing options • Large and sharper screen • More local storage capacity • More powerful hardware that can run a richer range of productivity programs and perform better at multitasking 	<ul style="list-style-type: none"> • Heavier • Larger • Consume more power and generate more waste heat • Shorter battery life • Cost more than tablets • Slower to boot up

The above table shows that each form factor excels at different activities. Tablets are not categorically better than notebooks; it all depends on what functions you are performing. Most of us engage in a wide range of daily activities, some of which are better performed by notebooks and others of which are more suited for tablets. For instance, you might watch 8 hours of movies on a single charge (tablet is more suitable), while taking a break to work on a complex spreadsheet for work (notebook is more useful).

Given the wide-ranging daily activities for which we rely on computing devices, common sense suggests a market, potentially a huge market, exists for hybrid devices that combine the best of both worlds (notebooks and tablets), while at the same time mitigating their respective weaknesses. A viable hybrid device that successfully challenges tablets and replaces traditional notebooks would need to have tablet advantages (i.e. touchscreen, portability, longer battery life, low heat generation, fast boot-up, and lower price) and notebook strengths (i.e. high productivity). Indeed, the emergence of such hybrid devices over the past year, with each successive generation demonstrating improvement towards combining the best of notebooks and tablets, shows that the potential market for convertibles is huge. We believe that within 12-18 months Wintel will have the technological capabilities to power convertibles that can seriously challenge tablets.

Will Intel Catch Up?

In our view, the market is wrongly extrapolating Intel's limited success to date with tablets. Rather, it is important to look at Intel's improvements that have already occurred and are yet to come. We think Intel is well on the path towards much greater success selling into the new form factors. Let's look at the progression of Intel's efforts.

In late 2011, Intel introduced the first generation of Ultrabooks to challenge tablets. Ultrabooks are basically improved notebooks that are thinner, respond faster (on boot and resume) and have longer battery life. They run on Intel chips but do not necessarily have a touchscreen. Storage can be flash-based (lighter, faster, but more expensive) and/or disk-based (heavier, slower, but more affordable). The first generation of Ultrabooks offered some advantages of tablets but did not go far enough to bridge the gap. It is therefore not too surprising that the first generation failed to take off.

Intel's persistence should not be doubted, and it certainly has the financial resources and engineering firepower to keep

trying. The second generation of Ultrabooks released late last year featured full size keyboards and touchscreens that are fold-over or detachable. These convertible devices are intended to retain the high productivity of notebooks while serving as tablets as well. The release of these convertibles helped close the gap further with tablets, but more work remains to be done.

We think Intel's third iteration this year will meet with better success because of Haswell, Intel's soon-to-be-released 4th generation Core processor family chip.⁶ The 22-nm Haswell chips are designed to provide better performance and power efficiency than its 22-nm 3rd generation Core chips ("Ivy Bridge"). *Intel's chief product officer David Perlmutter said at the Intel Developer Forum in September 2012 that they have reduced the idle power of the Haswell chips by more than 20 times over the 2nd generation Core chips ("Sandy Bridge"), while delivering outstanding performance and responsiveness.*⁷ According to a ZDNet article dated 9/11/12, Perlmutter further said that "Haswell was designed with 'mobility in mind' and is meant to work with everything from 'sleek tablets' to Ultrabooks to 'eventually' high-performance desktops and workstations. The first systems based on Haswell CPUs are expected to ship in the first half of [2013]."⁸ In a CNN article dated 1/7/2013, Intel's PC Client Group General Manager Kirk Skaugen said that Haswell chips on the new Ultrabooks can provide all-day battery life and are designed to work naturally with voice and touch.⁹ Assuming Haswell performs as advertised, Haswell-powered convertibles should be able to retain the high productivity of notebooks while offering the advantages of straight tablets.

While Haswell looks promising for convertibles, they are not yet ready for straight tablets. As noted by Intel's Perlmutter in an interview with EE Times in September 2012, "a Haswell tablet's performance would require a slightly bigger battery, making it heavier, thicker and more expensive, while fanless cooling would also remain a challenge."¹⁰ However, CNET reported in early March 2013 that Intel will release the 14-nm shrink of Haswell ("Broadwell") later in 2013, which should further improve power efficiency and cost.¹¹

In addition to the convertibles market, Intel is also looking to penetrate tablets. While we wait for Broadwell to launch, Intel is attacking the tablet market with its lower-end Atom chips. The majority of tablets and smartphones currently run on ARM-based chips because they are more energy efficient and provide a longer battery life. But Intel's Atom chip family is closing the gap with ARM-based chips. In a review done by AnandTech that compares the current-generation 32-nm Atom processor ("Clover Trail") against Nvidia's current-generation 40-nm ARM-based Tegra 3, Clover Trail is faster than every ARM-based chip on the market today with the exception of Cortex A15, although it underperforms in terms of graphics performance.¹² Power efficiency on Clover Trail is, importantly, not an issue. Further, Clover Trail can run legacy Windows applications, which is not possible with existing ARM-based chips.

Intel is relentlessly working on improving Clover Trail. In February 2013, Intel announced a new dual-core Atom chip ("Clover Trail+") for smartphones and Android tablets.¹³ Clover Trail+ delivers double the computing performance and up to three times the graphics capabilities compared to the earlier Atom Processor Z2460 platform (2 generations older than Clover Trail+), with competitive battery life. Customers announcing support for Clover Trail+ for smartphones and tablets include ASUS, Lenovo, and ZTE. Clover Trail+ will eventually be replaced by the next-generation 22-nm Atom chips ("Merrifield"). Also based on the 22-nm process are the quad-core Atom chips ("Bay Trail") that are scheduled to be available for holiday 2013. Bay Trail is expected to deliver twice the computing performance of Intel's current-generation 32-nm Atom chips, better battery life, and enable tablet designs as thin as 8mm.

Given the likely technological progression of Core and Atom processor families, backed by Intel's superior manufacturing and engineering capabilities, we are optimistic that Intel will become increasingly successful selling into the new form factors.

Will Microsoft Catch Up?

Microsoft has also encountered difficulty to date selling into the new form factors. Windows 7 was not touch-enabled and therefore not a viable operating system for tablets. The first Microsoft operating system for tablets was Windows RT, which worked on ARM-based tablets. Along with Windows RT Microsoft also released Surface in October 2012, its own tablet with a detachable keyboard. Because Surface has so far failed to gain traction, the naysayers predict that Microsoft's plans to benefit from tablet or tablet-like devices are dead on arrival.

We believe Surface was in fact a “fill-in” device, released into the tablet space as a “me-too” product, until Microsoft could finalize its real differentiators, Windows 8 and Surface Pro. Surface simply did not have enough differentiation from competing tablets to be widely embraced. The device used similar ARM-based chips, with comparable power usage, battery life, heat generation, and price as competing tablets. And while it came with a detachable keyboard, it lacked many of the applications available for Android tablets and iPads. Most importantly, Surface did not offer clear productivity advantages over traditional tablets, because Windows RT cannot run a complete, regular version of Office or legacy Windows applications. This lack of backward-compatibility rendered Surface an ineffective productivity device. In contrast, Windows 8 is backward-compatible and offers much better productivity. In our view, Surface’s lack of success sheds no light on whether Windows 8 will ultimately be successfully adopted in convertibles and tablets.

The Surface Pro tablet, released in February 2013 and running on Windows 8 Pro and Intel’s chips, is designed to offer more productivity than competing tablets in the market. It is likely to meet with more success than Surface over time, as Surface Pro can run a complete regular version of Office and all other legacy Windows applications. Essentially, Surface Pro running Windows 8 Pro fixes the shortcomings of Surface and Windows RT as productivity tools. In our view, Microsoft has finally given users a reason to buy a Windows 8 tablet – namely high productivity that other ARM-based tablets cannot match. It is therefore not surprising that Bloomberg recently reported Surface Pro is selling faster than Surface. Surface Pro is likely to be especially attractive for business users, as it provides excellent interoperability with Windows Server products that are widely used by enterprises. Further, as the number of applications optimized for Windows 8 devices grows over time, Windows 8 should see further penetration into tablets and convertibles.

Closing Thoughts

In a dynamic business world and especially for the technology sector, it is dangerous to extrapolate. It is imprudent to underestimate Microsoft and Intel based on their limited progress to date competing in the non-PC centric space. Wintel has ample financial and engineering capabilities to adapt to changed circumstances. After some false starts and mistakes, both Intel and Microsoft look like they will have the needed technology and the necessary supporting ecosystems within the next 12-18 months to power devices that seriously challenge ARM-based tablets. The touch-enabled Windows 8, along with Microsoft’s huge installed base, domination of the enterprise with interoperable Windows Server products, the widely used Office and other Windows-based applications, and the enhanced security of Windows 8 are major factors that will encourage Windows 8 adoption over time in both PC and non-PC form factors. Intel, likewise, should be able to offer chips spanning from the Atom family to Haswell and Broadwell in the coming year which can provide superior performance to ARM-based chips while being competitive on power usage, heat generation, battery life and boot-up time.

The current highly depressed stock prices of Intel and Microsoft assume no future growth for these companies. In contrast, we expect Wintel 2.0 will win a meaningful share of the non-PC centric market over time, but even a modest level of success penetrating these new form factors will beat the low market expectations embedded in Wintel’s stock prices. This in turn should help rekindle investor interest and push the stocks up.

End notes:

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