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三大電腦晶片製造商之財務比較

A Comparison of Major Computer Chipset Vendors

In Financial Point of View

Student: Roger Chang

Advisor: Professor James Liu

中華民國一〇一年六月

June 2011

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# **Abstract**

## **A Comparison of Major Computer Chipset Vendors In Financial Point of View**

**By  
Roger Chang**

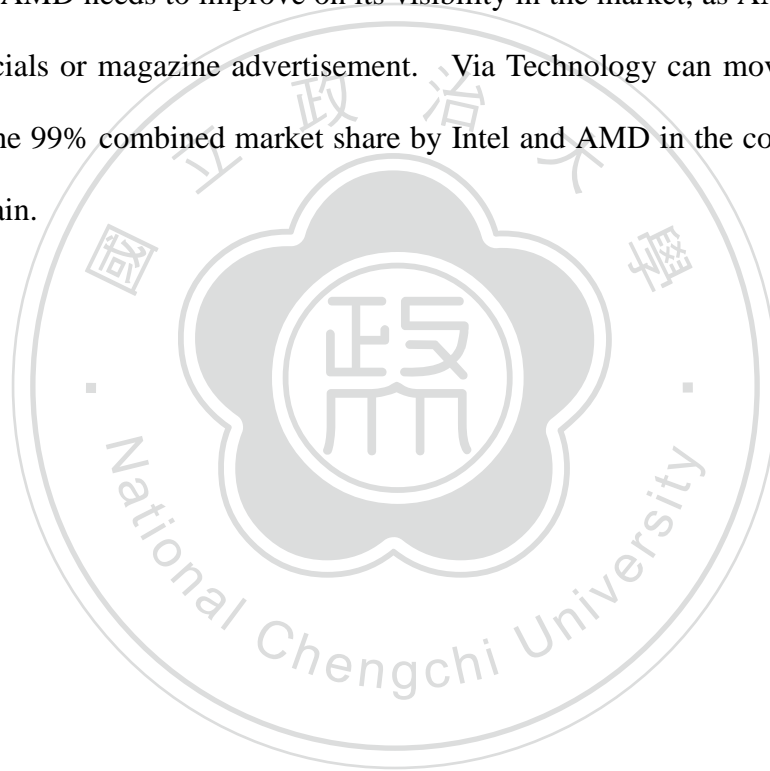
The goal of this master thesis is to analyze the three major chipset players in today's Personal Computer (PC) industry, while providing recommendations in different perspectives. One of the perspectives is from the investor's point of view to single out a company with the most long term investment value. The other is from each company's management point of view to suggest for the areas of improvement for the companies. Two of the three companies discussed in this thesis are American-based global companies namely, Intel and AMD, while the other is a Taiwanese company: VIA Technology.

Various analyses were made to evaluate each company. In the general comparison of the companies, each company's background information, product competitiveness, SWOT analysis and market share were discussed. In the finance diagnostics for each company, financial data from 2007 to 2010 were used as the basis in revealing a company's quality and its ability to manage different types of risks. Enterprise value (EV), which was derived from the financial report, reflects a company's true value. And each company's EV per share was compared against their stock prices to see whether their stock prices have been reasonable or not.

In conclusion, as an investor, Intel is the best choice for long term investment because of its scale

and profitability. And as of the end of 2010, Intel's stock price was below its enterprise value per share, so there was room for its stock price to rise. In addition, from the profit model map, Intel is located very close in region A in 2010 and it shows Intel is a very well-managed and profitable company.

In management point of view, Intel would need to find its place in the emerging tablet PC market, which is being dominated by ARM architecture, as opposed to the x86 architecture in which Intel specializes at. AMD needs to improve on its visibility in the market, as AMD is rarely being seen on TV commercials or magazine advertisement. Via Technology can move to a niche market in order to avoid the 99% combined market share by Intel and AMD in the consumer PC market and be profitable again.



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# 1. Introduction

## 1.1. Motivation and Goal

A profitable stock investment has always been the number one goal in every investor's mind. In order to be profitable, there is no shortcut and many different things need to be studied. Various tools were developed to forecast the short term and the long term prices of the stock of a company. There is a saying that in the world of stock exchange: what happened yesterday does not tell you what will be happening tomorrow. The statement is so true, just look at what happened in the internet bubble in the early 2000's; and more recently, the 2008 subprime financial crisis. Even the most brilliant minds in the world are not able to be successful in every investment they make. As individual investors of stocks, there are things we can do in order to minimize the risk of our investments. Individual investors can evaluate a company by the information that is publicly announced by the company: the annual financial reports.

The scope of this study is limited to the computer chipset industry. The goal is to go into the publicized financial statements of the three remaining players in the x86-based computer chipset industry. Today, the personal computer chipset industry comprises of two American-based players in AMD and Intel, and one Taiwanese company in VIA Technology. Various financial analyses have been done in this study to provide a low risk and profitable investment advices to the investors for their long term investments in the industry. The study also provides valuable advices to the executives of the three companies.

## 1.2. Methodology

Since there are only three vendors in today's personal computer chipset industry, they are all chosen to be included in this study. Some of the technical terms that are often used in the world of computers are defined in the glossary section, so that the audiences who are not familiar with the computers can easily go through this study.

Background information of the three companies are introduced. Moreover, additional information such as founders, products, market shares, product comparisons, SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis for each of the three companies are also presented in this study.

In the financial analysis, important numbers of interest from the income statement and balance sheet are listed. Then the readers of this study are taken into the financial side of the companies with the cash flow analysis, the study of the quality of the companies, and the risk analysis of the companies. A profit model map is presented to show where each company stands in terms of return on resources.

In the conclusion, a recommendation to the investors for the long term investment in one of the three companies is suggested. In addition, managerial advices to the companies' executives are also provided.

## 1.3. The PC industry today

There are only three personal computer chipset vendors remaining in today's PC market, they are Intel, AMD and VIA Technology. Intel is the "big brother" of the three, occupying almost 80% of

the market. AMD is second in terms of market share, at about 20%. VIA Tech rounds up the remaining market with less than 1% market share in the PC market.

The demand of the desktop PC has been decreasing over the past few years, while notebook PC has been growing significantly. However, due to the brilliant innovation of the Apple Computer, tablet PCs (e.g. iPad) are the next superstar product in PC market. All of the three companies are making push in the tablet PC supply chain. However, the x86 structure that the three giants excel in is not as competitive in the tablet PC applications as the ARM structure. Users of the tablet PCs expect long battery life, quick internet browsing and light weight. These characteristics are by far the strengths of the ARM structure, thus there are many challenges to be overcome for the three x86 giants to be as successful in the tablet PC market as they had been in the personal computer market.

Despite of the emergence of tablet PCs, the increasing demand of the chipset in the server market presents new opportunity for Intel, AMD and VIA Tech. The term CLOUD represents a concept that everything can be done remotely. That means a user only needs to connect to the CLOUD servers with a simple internet-capable device. Applications and computations are being run by the CLOUD servers, as opposed to the traditional way of running the applications on the user's own computer. Therefore, the three computer chipset vendors all are focusing on the server market more than ever before.

## 2. Background information of the Big Three

### 2.1. Intel

Intel is an American-based global technology company and the world's largest semiconductor chip maker. Intel is the only one of the three vendors that does not outsource its chips to other semiconductor manufacturers such as TSMC (Taiwan Semiconductor Manufacturing Company) because Intel has the leading capability in semiconductor manufacturing. Founded in 1968 by Robert Noyce and Gordon Moore, Intel is also the inventor of the x86 series of microprocessors: a technology which is used in almost every personal computer today. The name Intel was transformed from its original name when the company was first founded: **I**ntegrated **E**lectronics Corporation. Intel's headquarter is located in Santa Clara, California, USA.

Intel's primary products were static random access memory (SRAM) chips. Not until the 1990s, when the personal computer market blossomed, Intel shifted its focus to designing and manufacturing microprocessors, and became the dominant supplier of the microprocessors for PCs. Intel became a household name in the 1990s with its famous advertising slogan of "Intel Inside", Pentium processors, and Centrino technology. Intel went public (NASDAQ:INTC) on October 13, 1971 at USD23.50. Intel ranked 48 of the world's most powerful brands in 2010, according to Millward Brown Optimor.

The line of microprocessors for the personal computers includes Intel Core i7, Pentium, and Celeron. In addition to the microprocessors, Intel also designs and manufactures computer chipsets that serve as the complementary parts to its processors, so that a so-called complete solution of a platform is delivered to the customers. Intel also delivers Atom-series microprocessors for low-power devices such as netbook computers and embedded systems. In

server application, Intel Xeon processors provide scalable performance and advanced reliability for data center environments. Intel provides Ethernet adapters that allow the connection speed up to as fast as 10 Gigabit when used along with Intel’s server products. Solid State Drives (SSD) are faster, lower power consumed, quieter and longer life span than the traditional hard drives, and Intel is the industry-leading vendor of the SSDs. In the end of its product line, Intel provides the wireless solutions for home and business for faster and better connectivity. The famous Intel Centrino technology simply means Intel’s platform solution plus its wireless adapter in a personal notebook computer.

2.1.1. Intel SWOT analysis

**Table 1: Intel - SWOT**

<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>• Leader in Technology and market share</li> <li>• Own fabrication site</li> <li>• Product marketing</li> <li>• Product innovation</li> <li>• Industry standard setter</li> </ul>	<p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>• Graphics processor</li> <li>• Lack of products for tablet PCs</li> <li>• Expensive retail pricing</li> </ul>
<p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• Continuing growth of notebook demand</li> <li>• Tablet PC, Pads</li> <li>• Computer graphics processor</li> </ul>	<p><b>Threats:</b></p> <ul style="list-style-type: none"> <li>• Increasing demand of tablet PC</li> <li>• AMD’s capability in graphics</li> <li>• Economic slowdown</li> </ul>

2.2. Advanced Micro Devices (AMD)

AMD is American-based multinational semiconductor company based in Sunnyvale, California, USA. AMD is the second largest supplier of x86-based microprocessors and it is arguably the largest supplier of the computer graphic processing unit (GPU). AMD was founded in 1969 by Jerry Sanders III, Ed Turney and a group of former Fairchild Semiconductor executives. AMD

was the producer of logic chips, then entered RAM chip business before concentrating on x86 compatible microprocessors. AMD became publicly listed in 1972 (NYSE: AMD).

AMD acquired ATI Technologies in 2006 to expand its product line to the graphic processing units. ATI was one of the two main suppliers of the GPU at that time, while nVIDIA was the other. The move was understood by some that AMD attempted to fight off the long time dominance of Intel in the personal computer chipset market, and the acquisition would give AMD a competitive edge in graphic processing since graphic processing is Intel's relatively weakness. The other notable strategy was that AMD spun off its manufacturing operations and joint ventured with an investment company, Advanced Investment Co., formed by the government of Abu Dhabi. The new venture is called GlobalFoundries Inc., and this move allows AMD to focus solely on chip design.

AMD's products range from CPUs, chipsets, GPUs, workstations, servers and embedded systems. AMD designs main stream CPUs, such as Phenom and Athlon, as well as low power solutions for embedded systems. ATI Technologies designed chipset for AMD CPUs before the merger, thus AMD, like Intel, also provides its customers with a complete platform in their computers. Furthermore, for graphic intensive or performance hungry users, AMD also provides graphics processor solutions to meet their needs. AMD graphics are also compatible with Intel platforms. Since typical workstations are capable of processing graphic intensive tasks, AMD's strength in graphic processing enables it to provide the end-users with smooth and high performing user experiences.

In 2010, AMD introduced the concept of the "Fusion". In Fusion, AMD integrated its GPUs into the CPUs, the new products are called the Advanced Processing Units (APUs). An APU is capable of delivering graphic capability that is comparable of a standalone GPU. That means the users or the manufacturers of the personal computers would not be paying for the extra standalone



graphic processor and are still able to enjoy the GPU-like performance. AMD believes Fusion will take personal computers to a new era with its performance, and reduced designing effort. For more detailed traditional x86 structure and AMD’s Fusion, please refer to appendix in section 5.2.

2.2.1. AMD SWOT analysis

**Table 2: AMD - SWOT**

<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>• Provider of complete solution for heavy graphic applications</li> <li>• World’s number two x86 architecture provider</li> <li>• Graphics performance</li> <li>• Lower retail pricing to Intel</li> </ul>	<p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>• Significantly behind Intel in market share</li> <li>• Financially weak after acquisition of ATI</li> <li>• Marketing and visibility</li> <li>• Products for tablet PCs</li> </ul>
<p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• AMD Fusion</li> <li>• Continuing growth of computer notebook demand</li> <li>• Tablet PC market</li> <li>• GlobalFoundries manufacturing, more focused in chip design</li> </ul>	<p><b>Threats:</b></p> <ul style="list-style-type: none"> <li>• Intel’s dominance in x86 architecture</li> <li>• nVIDIA’s capability in graphics and tablet PC solution</li> <li>• Economic slowdown</li> </ul>

2.3. VIA Technology

VIA Tech is a Taiwanese computer microprocessor and chipset vendor. It was first established in Fremont, California, USA in 1987 by Wenchi Cheng and Sher Wang. Its headquarters were moved to Taipei, Taiwan in 1997. VIA Tech is a fabless semiconductor company, CPUs and chipsets are designed in-house and the manufacturing is outsourced to a third party foundries like TSMC. VIA Tech became publicly listed in 1999 in Taiwan Stock Exchange (TWSE: 2388). The name: VIA, stands for Very Innovative Architecture.

In 1999, VIA Tech purchased Cyrix and Centaur's microprocessor division from National Semiconductors and Integrated Device Technology (IDT) respectively. The acquisitions marked VIA's entry to the market of computer microprocessors.

In September, 2001, Intel filed a patent infringement lawsuit against VIA. Intel claimed 5 patents in its Pentium processors were violated. VIA fought back by countersuing the Pentium processor infringed a patent jointly held by VIA Technology and Centaur. VIA sought for monetary compensation and asked the court to block the sale of Intel's Pentium processors. The lawsuit involved 11 cases in five countries and 27 patents. It was settled in April, 2003, Intel granted VIA to sell microprocessors that are compatible with the x86 instruction set at the heart of Intel's chips. On the other hand, VIA agreed to pay license royalty on certain Intel products. The settlement didn't grant the increase in market share as VIA had hoped for. Major motherboard vendors refused to use VIA's chipset because Intel was not willing to supply its processors to the motherboard vendors who also manufactured motherboards of VIA chipsets. That is why VIA's market share and profitability actually started to decline after the lawsuit.

VIA Tech provides a complete x86 structured platform for desktop computers, ultra-mobile computers and embedded system. VIA Tech's products include computer processors, chipsets, graphics processors S3, embedded solutions, audio controllers, video ICs such as TV encoders, networking solutions and other peripherals like USB controllers.

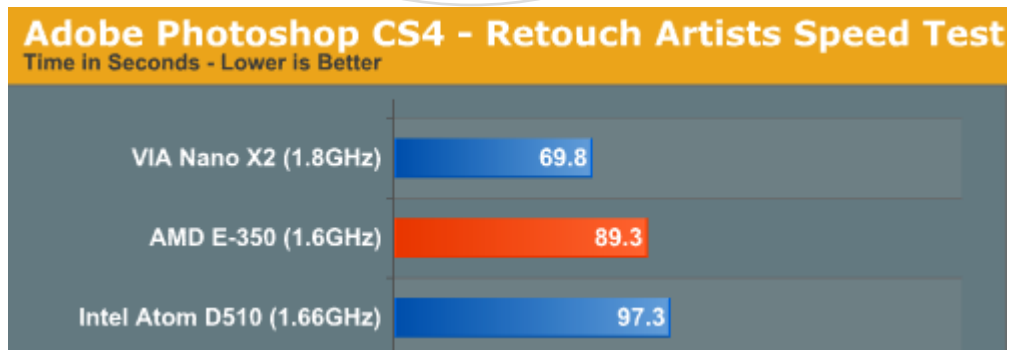
### 2.3.1. VIA Technology SWOT analysis

**Table 3: VIA - SWOT**

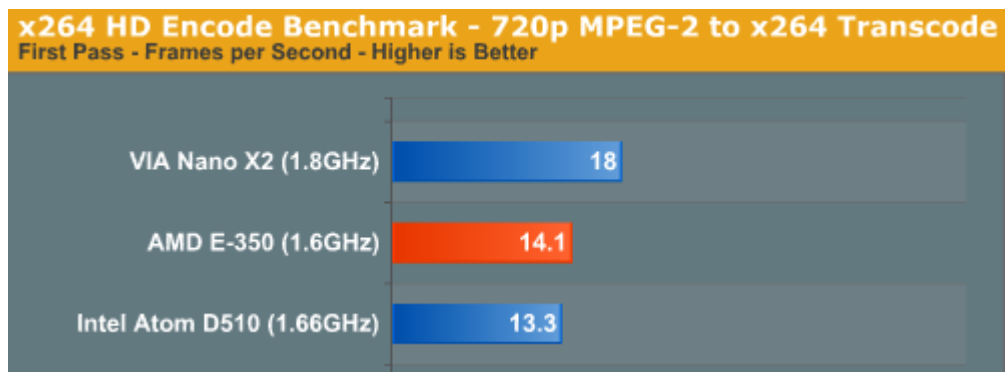
<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>Variety of products</li> <li>Lowest retail pricing among the three</li> </ul>	<p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>Lack of products supplied to major computer brands (HP, Acer)</li> <li>Very low market visibility</li> </ul>
<p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>To cut into major computer brands' supply chains</li> <li>Tablet PC, Pads</li> <li>Development of ICs for other functionalities</li> <li>Niche market</li> </ul>	<p><b>Threats:</b></p> <ul style="list-style-type: none"> <li>Competition from other ICs design houses</li> <li>Intel or AMD lowers retail prices</li> </ul>

### 2.4. Product comparison of the companies

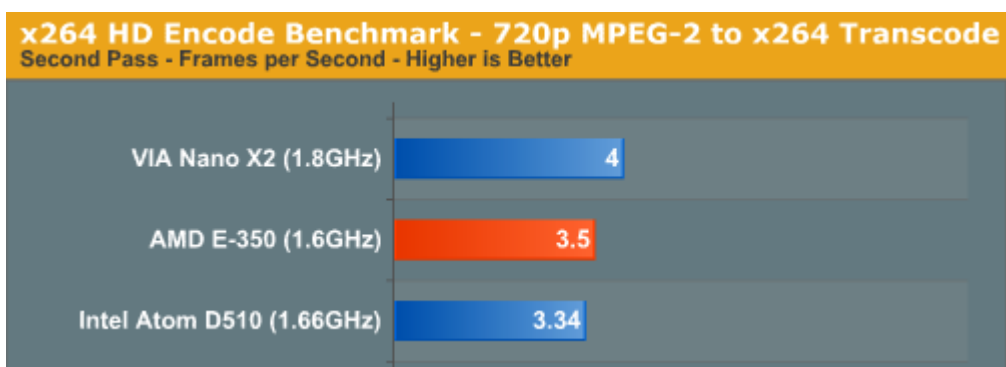
Various performance benchmarks show that VIA Tech's products are not far behind from either Intel or AMD, and they actually perform better in some benchmark tests. The figures below illustrate the relative performances of the CPUs within the same class from the three vendors. More performance benchmarks comparisons can be found in the appendix in section 5.3.



**Figure 1: Adobe Photoshop benchmark**



**Figure 2: x264 HD Encode Benchmark – First Pass**



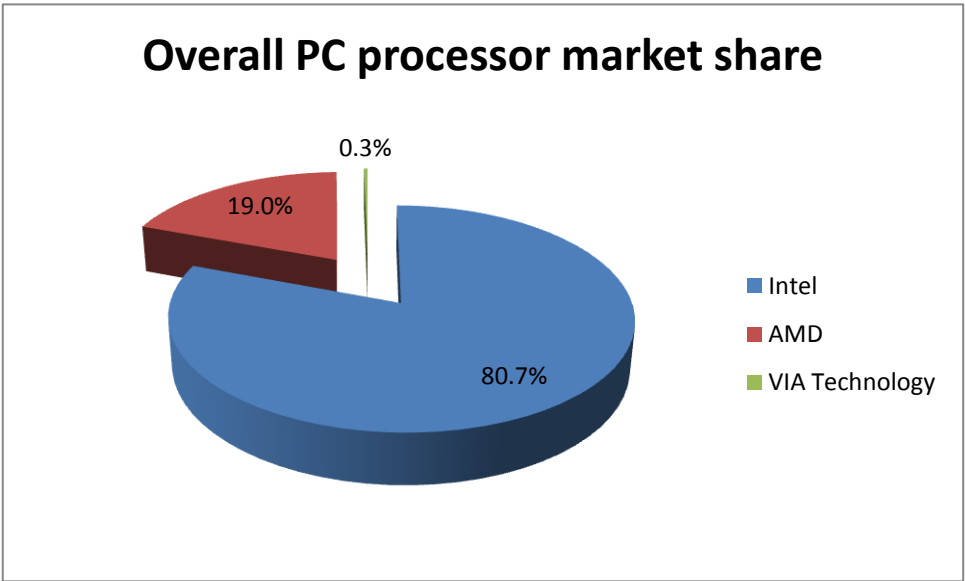
**Figure 3: x264 HD Encode Benchmark – Second Pass**

## 2.5. Market share

There are three main segments in the x86-based microprocessor market: desktop, mobile and server. In the year of 2010, the market was shifting towards the mobile computers. According to International Data Corporate (IDC), Desktop processor unit shipments grew 6.2%, while mobile PC processor unit shipments grew 26.2%. In 2009, mobile PC processors represented 50.2% of all PC shipped, and the number grew to 54.1% in 2010. Lastly, x86 server processor unit shipments grew 28.1% in 2010. IDC's forecast growth in PC processor unit shipments is 10.1% in 2011.

Intel commanded about 80.7% of the overall microprocessor market in 2010; while AMD occupied about 19% of the market; VIA Technology rounded up the market with 0.3% market share.

Overall PC processor market share in 2010 is shown in Figure 4.



**Figure 4: Overall PC processor market share in 2010**

The ranking of the big three in terms of market share in each of the three PC processor market segments are summarized in the Table 4.

**Table 4: PC processors market share in 2010**

	Desktop	Mobile	Server
Intel	72.0%	86.4%	93.0%
AMD	27.6%	13.3%	7.0%
VIA Technology	0.4%	0.3%	0%

Figures 5, 6 and 7 show the graphical representations of the 2010 microprocessor market share in the desktop, mobile and server segments respectively.

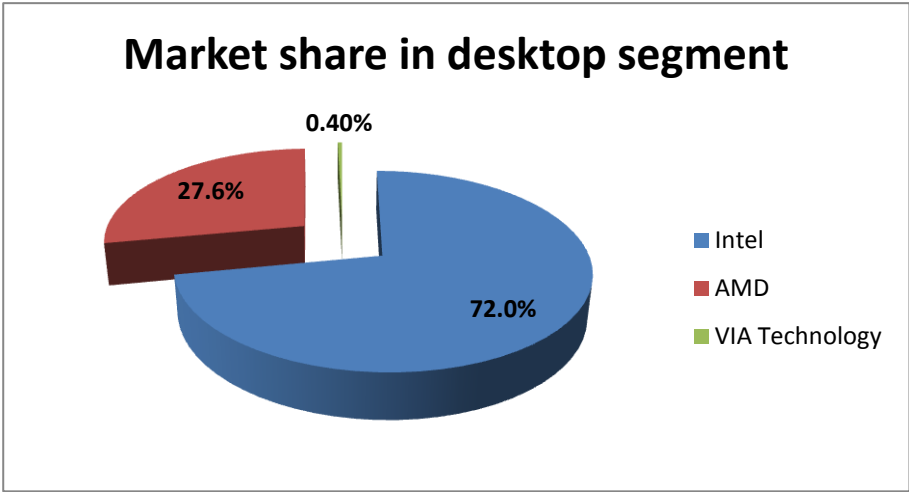


Figure 5: Desktop PC processor market share in 2010

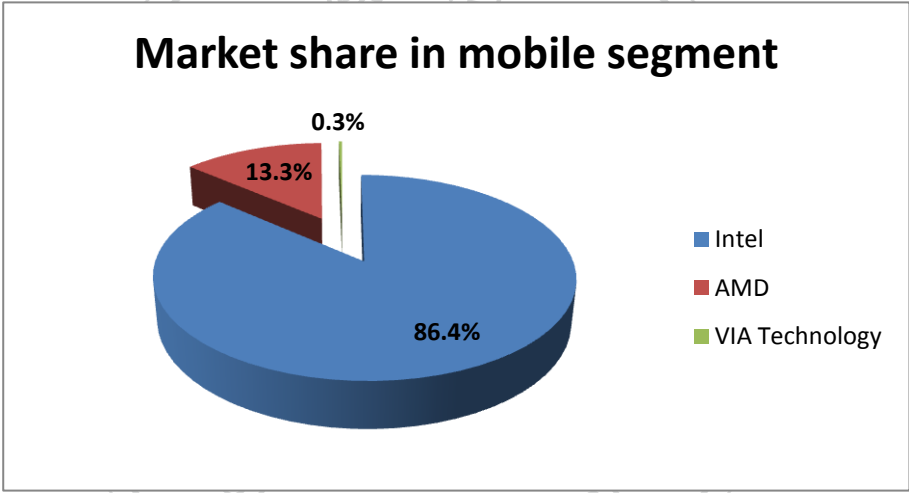


Figure 6: Mobile PC processor market share in 2010

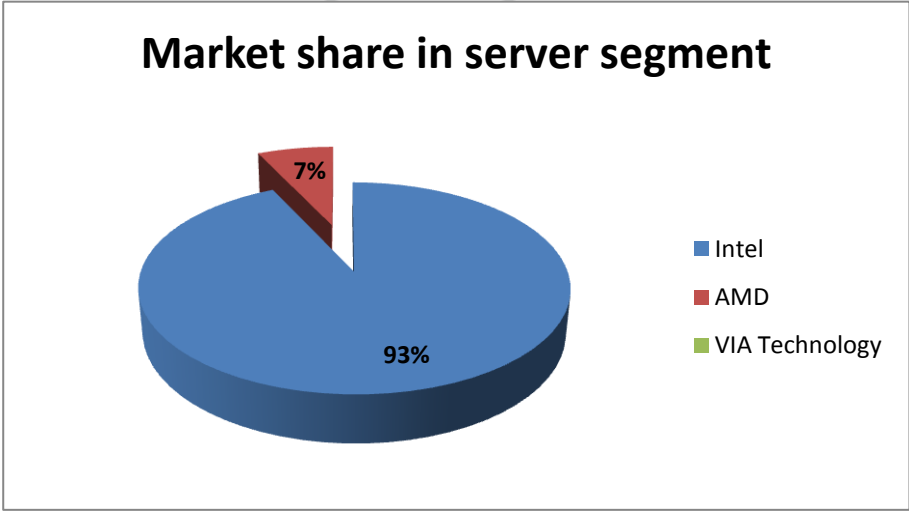


Figure 7: Server processor market share in 2010

### 3. Financial Analysis

#### 3.1. Important numbers

In this study, there are a few numbers that need to be retrieved from the income statements and the balance sheets of the companies. Then, the numbers are derived into several metrics to evaluate the enterprise values, qualities and risk managements of the companies. A list of numbers retrieved from the financial statements is shown in table 5.

**Table 5: Important Financial Numbers**

Source	Numbers	In short
Income Statement	Revenue	Rev.
	Gross Profit	GP
	Sales, General and Administration	SG&A
	Other expenses	Others_IS
	Earnings before interest and tax	EBIT
	Interest expense	Int.
	Provision for tax	Tax
	Net profit	NP
Balance Sheet	Cash and cash equivalents	Cash
	Inventory and account receivables	Inv. + A/R
	Account payables	A/P
	Property, plant and equipment	PPE
	Other assets	Others_BS
	Debt	Debt
	Equity	Equity
Statement of Equity	Number of shares	Shares

Metrics that are used to evaluate companies are defined in Table 6. Detailed calculation of each company can be found in the appendix.

**Table 6: Financial Metrics**

Metric	Item	Definition	Calculation
	WC	Working Capital	Inventory + A/R – A/P
	Q	Required operating asset <sup>(1)</sup>	WC + PPE + Others_BS
Cash flow	FCF	Free Cash Flow	NP - $\Delta$ Q
	FinAct	Financial Activities	$\Delta$ Debt + ( $\Delta$ Equity – NP)
	CF	Cash Flow	FCF + FinAct
Enterprise value	EV	Enterprise Value	(EBIT / CoC) + Cash – Debt – A/P + (A/P + Q) * 0.7 <sup>(2)</sup>
	EV / Share	Enterprise Value per share	EV / shares
Quality of company	g(EBIT)	Growth	[EBIT <sub>(n)</sub> – EBIT <sub>(n-1)</sub> ] / EBIT <sub>(n-1)</sub>
	WC / Rev.	Competitiveness	WC / Rev.
	RoRes	Return on Resources	EBIT / (Q + 4 * SG&A)
	EBIT / GP	Management efficiency	EBIT / GP
Risk management	(Inv. + A/P) / GP	Operating risk	(Inv. + A/R) / GP
	Risk_InvH	Investment / Expansion risk	$\Delta$ EBIT / $\Delta$ Res. <sup>(3)</sup>
	Risk_FinH	Financial risk	EBIT / Debt
	Cash / SG&A	Survivability	Cash / SG&A
	EV / Eq	Enterprise value per equity	EV / Equity

1. Required operating asset means assets required to keep the company running
2. CoC is cost of capital. In this study, 15% is used.
3. Res. means Resources where Res = Q + 4 \* SG&A



## 3.2. Comparisons between the companies

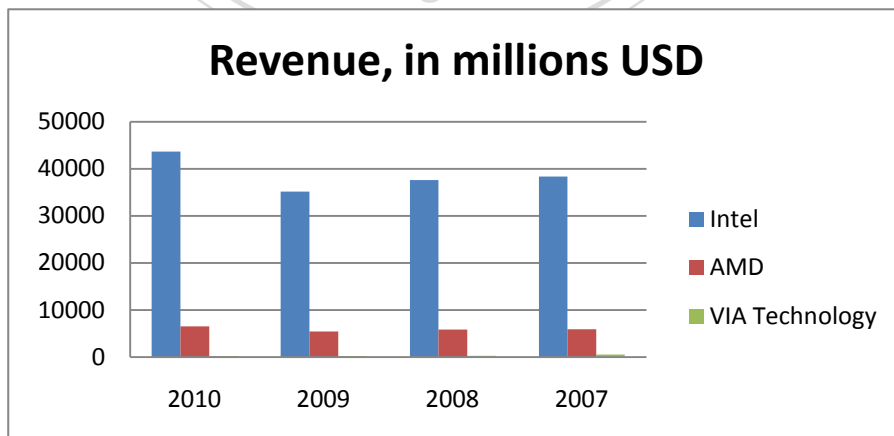
### 3.2.1. General comparisons

#### 3.2.1.1. Revenue

The scale of a company can be seen from the amount of its sales, or the revenue. Intel is the giant among the three. Intel's revenue is about 7 times as much as AMD and 260 times as much as VIA Tech. The large gaps in revenues between the companies also reflect how the overall PC microprocessor market is shaped. Based on Table 7, in the years of 2008 and 2009, revenues for the three companies dropped, it is very likely due to the subprime financial crisis during that period.

**Table 7: Revenue**

<b>Revenue, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	43623	35127	37586	38334
AMD	6494	5403	5808	5858
VIA Technology	170	163	264	489



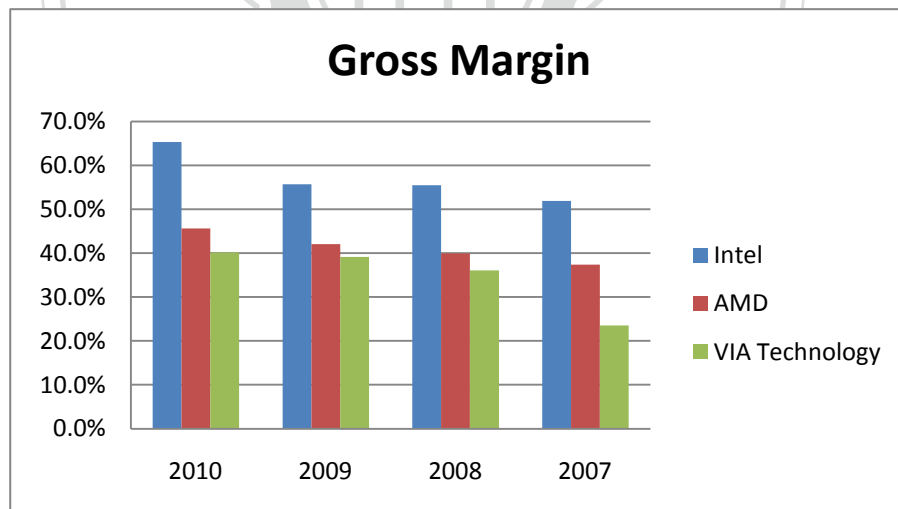
**Figure 8: Revenue**

### 3.2.1.2. Gross profit margin

A company's ability to turn raw materials into income can be reflected by its gross profit margin. The higher the gross profit margin, calculated in percentage of revenue, the more efficiently the company manages its raw materials. Table 8 shows the gross profit margin of each company. In 2010, Intel's gross margin is the highest among the three at 65.3% of its revenue; AMD's gross margin was 45.6% of its revenue; VIA Tech's gross margin was 40.1% of its revenue. Gross margin percentages for all three companies have been improving over the past 4 years.

**Table 8: Gross margin**

<b>Gross Margin</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	65.3%	55.7%	55.5%	51.9%
AMD	45.6%	42.1%	39.9%	37.4%
VIA Technology	40.1%	39.2%	36.0%	23.5%



**Figure 9: Gross margin**

### 3.2.1.3. Net profit

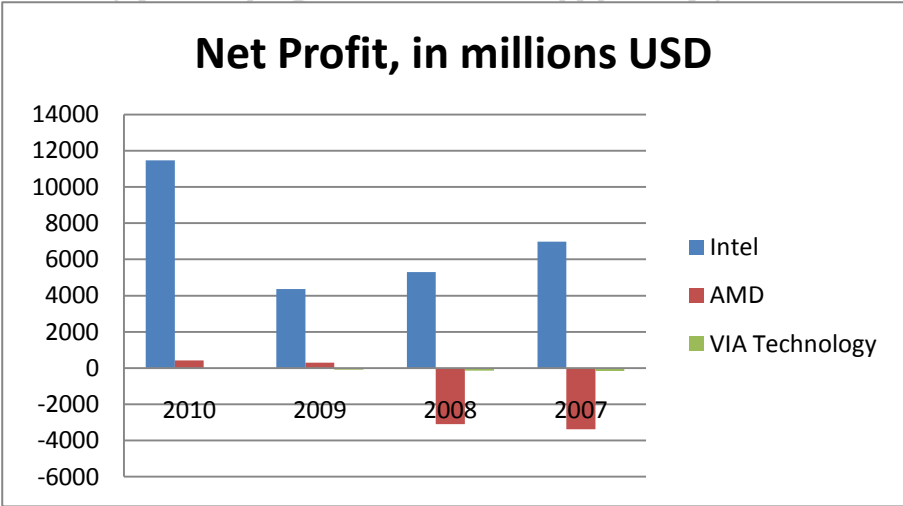
Based on net profit information shown in Table 9, Intel made about 26 times as much as AMD in 2010, considering Intel's revenue was only 7 times as much as AMD's, the fact reflects Intel makes

the most out of its resources to make profit. AMD’s negative amounts in its net profits in 2007 and 2008 were largely due to its acquisition of ATI. AMD paid 4.3 billion in cash and 58 million shares of stocks totaled US\$5.4 billion in purchasing ATI. However, AMD became profitable in 2009 after making significant losses in previous years.

It is also interesting to find out that VIA Technology has not been making money in the past 4 years. The continuing loss may be due to VIA Tech’s vulnerability in the market share. The good news for VIA Technology is that the loss in profit has been declining. VIA Tech owns about 3,800,000 shares of Taiwan’s most profitable and highest-priced stock in HTC. The cost per share is about 400 NTD, and these stocks at this time translate to about 100 million US dollars of profit.

**Table 9: Net profit**

<b>Net Profit, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	11464	4369	5292	6976
AMD	431	293	-3096	-3379
VIA Technology	-27	-94	-134	-165



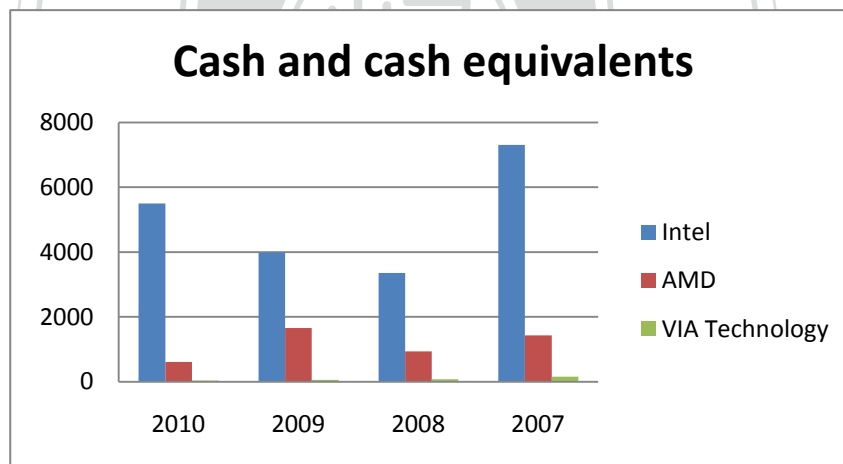
**Figure 10: Net profit**

### 3.2.1.4. Cash and cash equivalents

Cash positions of each company are shown in Table 10. Intel is holding the most cash among the three companies: 9 times as much as AMD has, and 140 times as much as VIA Tech has. There was a jump in AMD's cash position in 2009 because AMD received about 800 million of cash from Abu Dhabi's Advanced Technology Investment Co. in the spun-off of GlobalFoundries.

**Table 10 Cash and cash equivalents**

<b>Cash and cash equivalents, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	5498	3987	3350	7307
AMD	606	1657	933	1432
VIA Technology	38	58	74	152



**Figure 11: Cash and cash equivalent**

### 3.2.1.5. Working capital

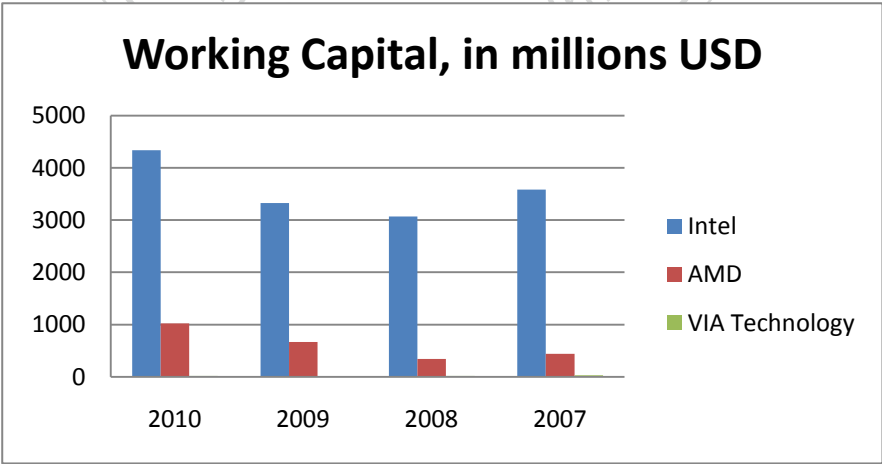
Working capital (WC) is a measure of both a company's efficiency and its short-term financial health. In this study, working capital is calculated by subtracting the account payables (A/P) from the sum of account receivables and inventory (A/R + Inv.). Even though the formula is different from the traditional formula, the meaning is the same. Working capitals of the three companies

are shown in Table 11.

All of the three companies have positive working capital, which means they are able to pay off short-term liabilities. However, a well managed company does not have large amount of working capital. When the WC of a company is large, based on our formula, it means that either the account receivable or the inventory is large, or both are large, and implies the money is not collected properly or the products are not sold well. On the other hand, a small WC can imply the account payable is relatively large because the products are well-received by the customers, the suppliers trust the payment to them would be credited and are willing to receive the payment at a later time.

**Table 11: Working capital**

<b>Working Capital, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	4334	3325	3066	3585
AMD	1019	665	345	441
VIA Technology	15	7	20	31



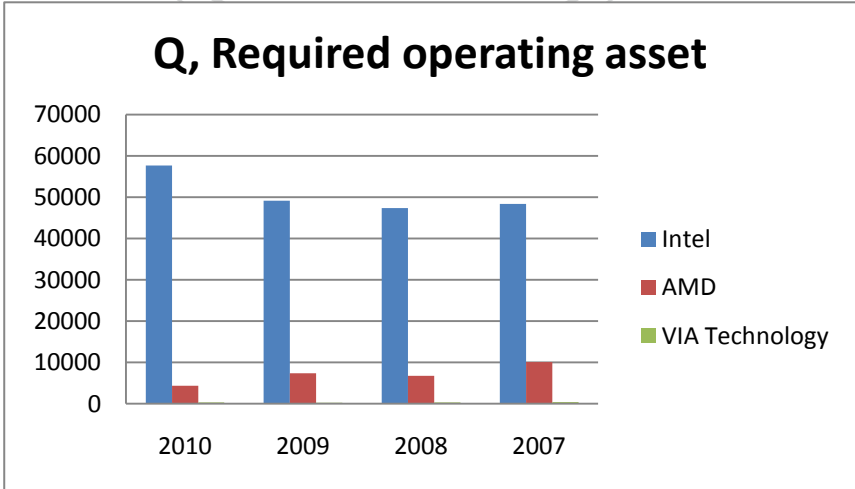
**Figure 12: Working capital**

3.2.1.6. Required operating assets

Required operating asset (denoted by Q in this study) can be defined as the asset a company needs in order to keep the company running. Q is obtained by WC plus PPE (property, plant and equipment) plus other asset in the balance sheet (others\_BS). In Table 12, we can see Intel's required operating asset has been increasing while both AMD's and VIA Technology's have been declining over the past few years. Intel has its own IC fabrication sites around the world, therefore as its sales grows, more operating asset needs to be inputted in order to produce at larger volumes. AMD's decrease in required operating asset in 2010 is due to the spun-off of the GlobalFoundries because its PPE dropped significantly in 2010 after the spun-off, it no longer needs as much asset as it did when there was a manufacturing facility to be raised. VIA outsources its manufacturing to wafer companies like TSMC so its required operating asset remains relatively steady over the years.

**Table 12: Required operating assets**

<b>Q, Required operating asset, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	57688	49108	47365	48344
AMD	4358	7421	6742	10118
VIA Technology	323	267	305	408



**Figure 13: Required operating assets**

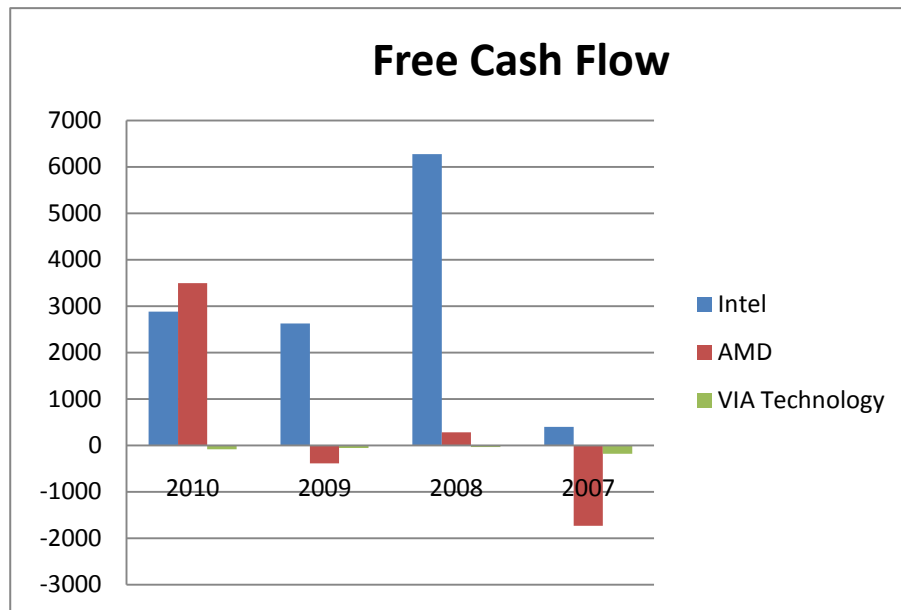
### 3.2.2. Cash flow comparison

#### 3.2.2.1. Free cash flow

Free cash flows (FCF) of the three companies are shown in Table 13. FCF is obtained by the net profit minus the change in required operating asset, where the change in the required operating asset ( $\Delta Q$ ) means the asset being invested into or pulled out from the previous year. Usually, a company will input more assets from the previous year, the additional Q is the amount that will be invested into the four types of assets: A/R + Inv., A/P, PPE and others\_BS. Positive free cash flow means a company has cash that can be flexibly used. If FCF is negative, as in VIA Technology's case, the company needs financing in order to afford the additional required operating asset. FCF is one of the two ways to show the true value of a company. Enterprise value (EV), which is discussed in later section, is the other.

**Table 13: Free cash flow**

<b>Free Cash Flow, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	2884	2626	6271	402
AMD	3494	-386	280	-1730
VIA Technology	-84	-56	-31	-177



**Figure 14: Free cash flow**

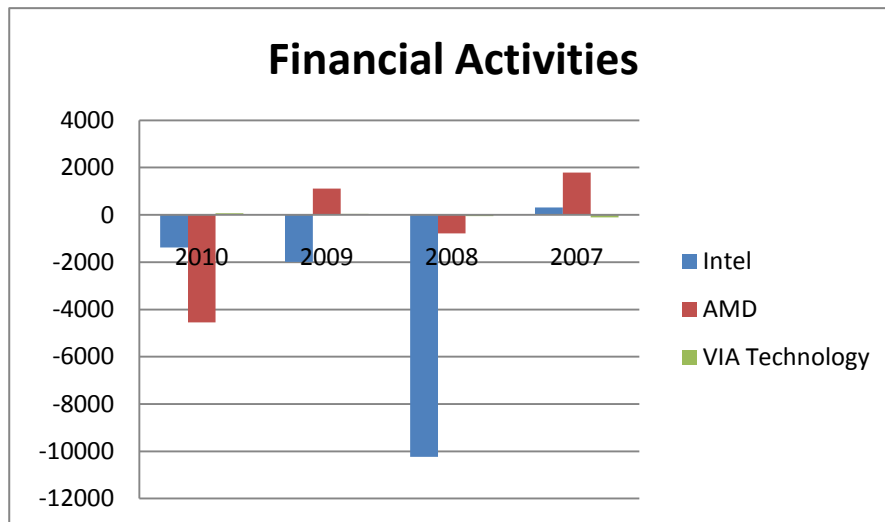
### 3.2.2.2. Financial activities

Financial activities, FinAct, are the cash a company receives either from the banks or other financing means, e.g. issuance of corporate stocks and bonds, so that the company has enough cash on hand to keep the operating activities ongoing. Keeping the cash on hand positive is particularly important during the economic downturns. In 2010, Intel and AMD had negative FinAct, it could mean that they did not need to borrow money from banks nor did they need to obtain extra cash from other financing means, while paying dividends to their shareholders or buying back their own stocks.

**Table 14: Financial activities**

<b>Financial Activites, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	-1373	-1989	-10228	307
AMD	-4545	1110	-779	1782
VIA Technology	64	40	-47	-107





**Figure 15: Financial activities**

### 3.2.2.3. Overall cash flow

The overall cash flows (CF) for Intel, AMD and VIA Technology are summarized in Table 15.

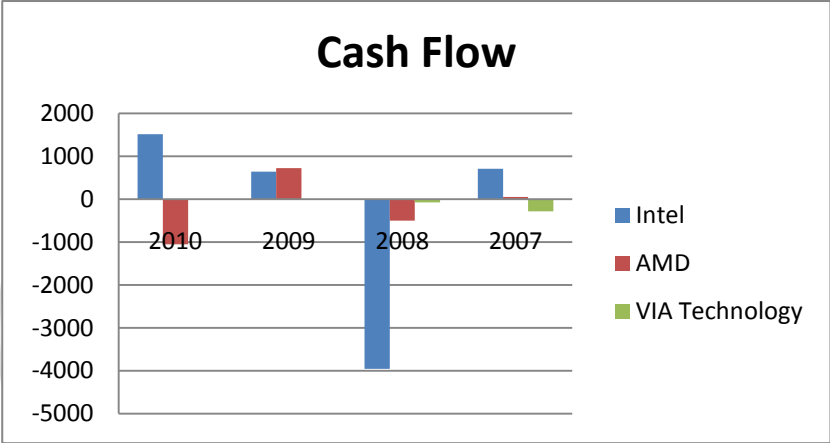
The overall cash flow does not necessarily reflect how a company does in terms of maintaining its cash flow. For example, a company has 100 million of free cash flow on hand and it was to spend 150 million on an investment. It is clear that the company does not have enough cash for the investment, so it needs to finance for the 50-million deficits. However, the company would always finance more than needed to keep its saving account with some cash. It is the reason why a company with large amount of CF does not mean that the company is doing well in maintaining its cash position, since the CF may mainly comes from the financing activities. In contrast, a negative CF does not mean the company is getting broken; it may be caused by the decline in debts, like in AMD's case in 2010, which makes its FinAct negative.

In 2010, Intel was the only one that had positive overall cash flow, although it did not need financing for extra cash. In AMD's case, since its FCF was positive in 2010, it did not need financing activities for extra cash, and its FinAct was a very large negative number since large amount of debt may be paid off by cash (section 3.2.1.4 shows AMD's cash position declined in

2010). In VIA Technology’s case, it did not finance enough money in 2010 to cover its deficit in FCF.

**Table 15: Overall cash flow**

<b>Cash Flow, in millions USD</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	1511	637	-3957	709
AMD	-1051	724	-499	52
VIA Technology	-20	-16	-78	-284



**Figure 16: Overall cash flow**

**3.2.3. Comparison in quality of the companies**

There are four quality metrics that are discussed in this study: growth of EBIT, competitiveness, return on resources, and internal management efficiency.

**3.2.3.1. Growth of EBIT**

The growth of EBIT, g(EBIT), reflects the ability of a company to continually improve in making profit. Intel’s growth in EBIT was slowed in 2008 and even dropped to negative in 2009 due to the decrease in PC demand during the subprime crisis. However, when the global economy turned

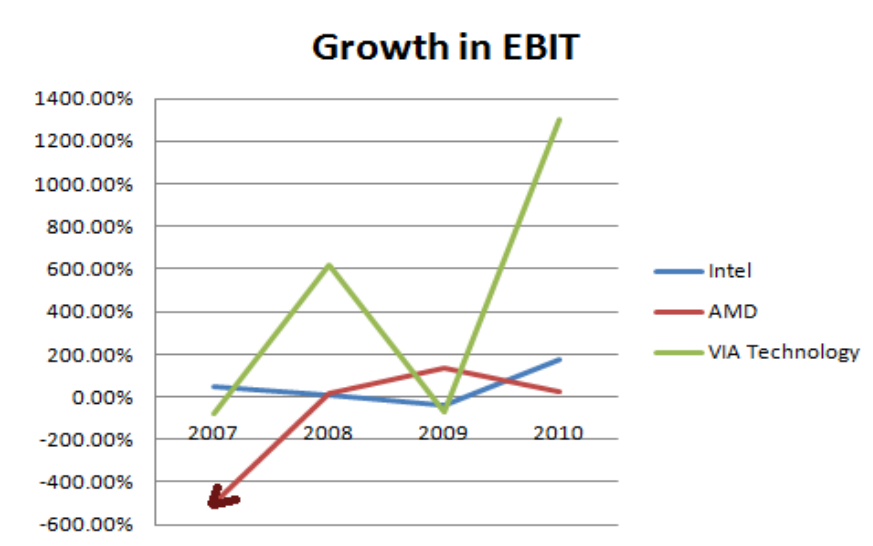
green, Intel regained its profitability. AMD's drop in EBIT was "outrageous" because of the acquisition of ATI in 2007. The acquisition cost AMD an amount of approximately 5.4 billion of cash and equivalent value of shares. Even though its EBIT grew in 2008, EBIT was actually a loss of about 2000 million. However, AMD's EBIT turns positive in 2009 with a growth of more than a hundred percent. VIA Technology made a big leap from 2009 to 2010 in terms of the growth in EBIT because its non-operating income increased significantly. According to its income statement, its major non-operating incomes came from the sales of fixed assets, and the evaluation of financial assets. VIA Technology own very valuable real estate properties in the great Taipei area, and sold some of them because the price level of real estate properties in Taipei has been skyrocketing over the last few years. Financial assets may be the 100 million USD (approximate 3 billion NTD) worth of HTC's shares that VIA Tech possesses. In addition, a few of the VIA Tech's spinoffs are starting to make profit and contribute to their mother company's income.

A few notable spinoffs of VIA Tech are:

- ViaLabs Inc.: a manufacturer of USB3.0 and SATA controllers.
- ViaTelecom: its CDMA controller ICs are used in 30% of China's CDMA cell phones, and just recently qualified and entered Samsung's supply chain.
- WonderMedia Technologies: its main product is ARM processors that target China's white-box tablet PC market.
- Chander: a listed company in Taiwan Stock Exchange and a major channel partner for VIA Tech.

**Table 16: Growth in EBIT**

<b>Growth in EBIT</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	172.95%	-36.22%	8.98%	45.36%
AMD	27.71%	133.96%	15.37%	-13488.34%
VIA Technology	1302.40%	-72.21%	615.48%	-80.91%



**Figure 17: Growth in EBIT**

### 3.2.3.2. Competitiveness

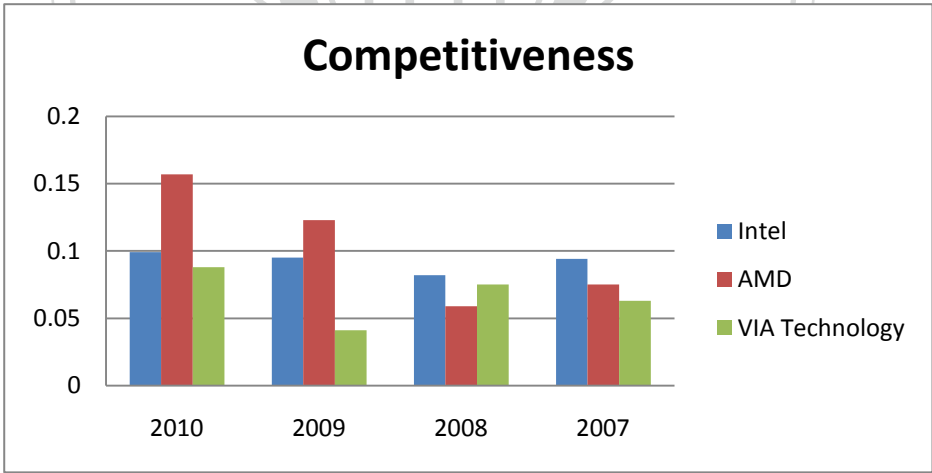
Competitiveness is calculated by working capital divided by revenue (WC/Rev.). The formula implies a company's competitiveness in its products. In the discussion of the working capital in section 3.2.1.5, small WC implies the products are well-received by the market, low inventory, downstream customers are willing to pay quickly for the products while upstream suppliers are willing to receive the payment at a later time. The lower the number is, the more competitive a company is. Table 17 shows the competitiveness of the three companies since 2007. It is surprising to see VIA Tech's competitiveness leads the pack in 2009 and 2010.

The low competitiveness value of VIA Tech is because of its relatively high account payable which was about 20% of its revenue in 2009 and 2010. In Intel's case, its account payable was about 5%

of its revenue; on the other hand, AMD’s account payable was about 10% of its revenue in 2009 and 2010. However, VIA Tech’s major channel partner Chander (TWSE: 8068), and major IC packaging and testing partner ASE Global (TWSE: 2311) are both having relatively high account receivable to revenue ratio: 13.2% for Chander and 14.2% for ASE Global. One thing to note is that Chander is one of the many spinoffs of VIA Tech, and ASE Global acquired another VIA Tech’s spinoff in Wei-Yu Semiconductors. This could explain why the two partners are being so friendly to VIA Tech, and the result is that VIA Tech is enjoying relatively high account payable, and hence high competitiveness score.

**Table 17: Competitiveness**

<b>Competitiveness</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	0.099	0.095	0.082	0.094
AMD	0.157	0.123	0.059	0.075
VIA Technology	0.088	0.041	0.075	0.063



**Figure 18: Competitiveness**

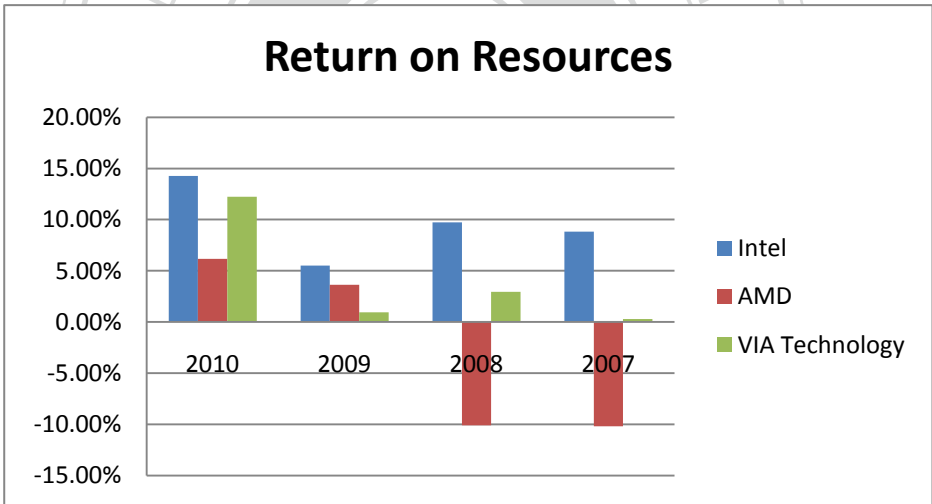
3.2.3.3. Return on resources

Return on resources (RoRes) is the return of a company’s input of resources. The amount of resources a company has can be computed by adding the required operating asset Q, and the SG&A.

In simple words, resources of a company are its assets and its people. Hence, return on resources is the earning over the resources a company invests in. A very well organized company would have RoRes greater than 15%. VIA Tech’s ReRos took a leap in 2010 due to the great growth in its EBIT for the reasons that are discussed in the previous section. Intel has always been able to utilize its resources effectively, and was approaching the very-well-organized-company standard of 15% in 2010. AMD continues to improve since the miserable years of 2007 and 2008.

**Table 18: Return on Resources**

<b>Return on Resources</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	14.27%	5.52%	9.73%	8.83%
AMD	6.18%	3.63%	-10.10%	-10.20%
VIA Technology	12.24%	0.95%	2.94%	0.29%



**Figure 19: Return on Resources**

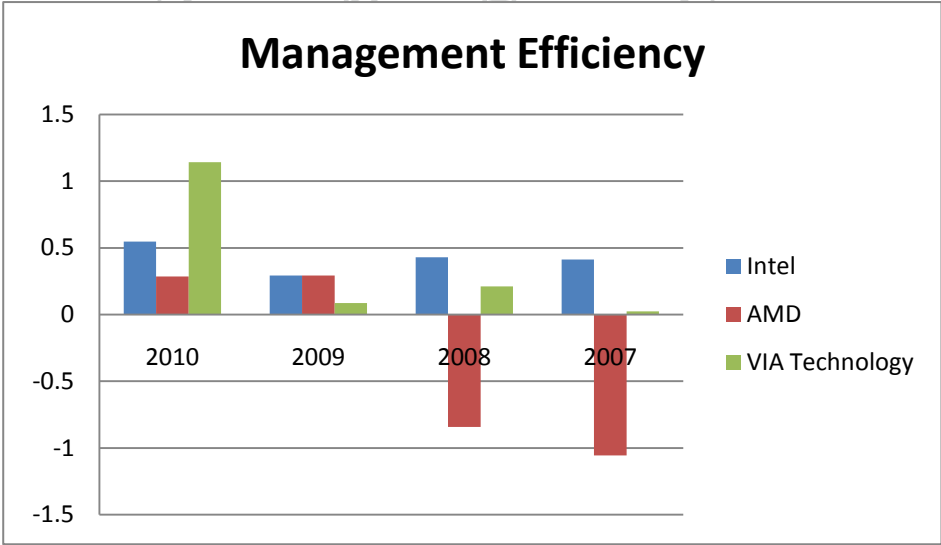
3.2.3.4. Internal management efficiency

Internal management efficiency is the earning (EBIT) for every dollar of gross profit. Since gross profit means the revenue without the cost of raw materials, internal management efficiency shows how a company reviews its internal processes and plans for the future. Intel is once again the outstanding one even though VIA Tech doubled Intel’s internal management efficiency in 2010.

Again, the high efficiency the VIA Tech accomplished in 2010 is due to the high EBIT it earned from non-operating activities. AMD had been steady in 2009 and 2010 and seems to get the past behind it.

**Table 19: Internal management efficiency**

<b>Internal Management Efficiency</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	0.547	0.292	0.43	0.413
AMD	0.286	0.292	-0.843	-1.055
VIA Technology	1.142	0.087	0.21	0.024



**Figure 20: Internal management efficiency**

**3.2.4. Risk management of the companies**

While four quality metrics were examined in the previous section, there are also four metrics to judge how a company manages the risks it faces. The four risks derived from the financial reports are operating risk, expansion or investment risk, financial risk and survivability risk.

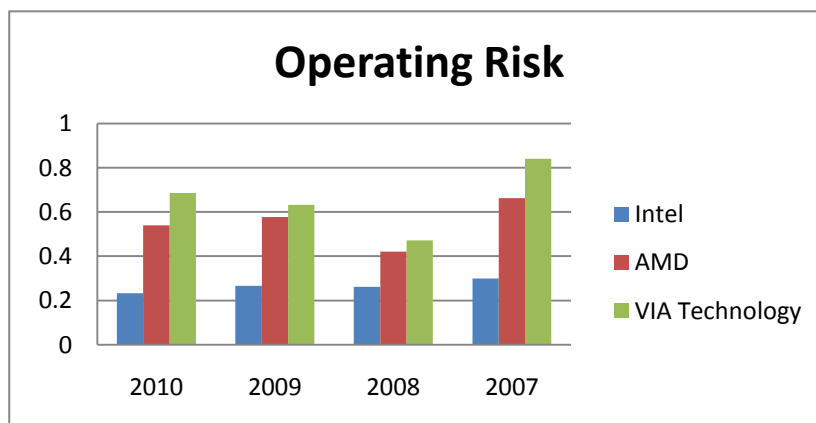
### 3.2.4.1. Operating risk

Operating risk reflects the risk faced when a company handles its customers and inventory during its operating activities. Operating risk is calculated by the account receivables plus inventory and divides the sum by the gross profit. The lower the number is, the better the company handles operating risk.

Table 20 summarizes operating risk of the three companies since 2007. Intel's operating risk value is the lowest among the three in every year since 2006, and more impressively, Intel's operating risk is only about half of the second placed AMD. The ranking has been consistent over the 4 year span, and it reflects the fact that Intel is the only company that has been operating steadily. In the same period, AMD had gone through the integration with ATI, and VIA Tech had gone through a very difficult period during which it had very low market share.

**Table 20: Operating risk**

<b>Operating Risk</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	0.232	0.266	0.262	0.299
AMD	0.54	0.577	0.421	0.662
VIA Technology	0.686	0.632	0.471	0.84



**Figure 21: Operating Risk**



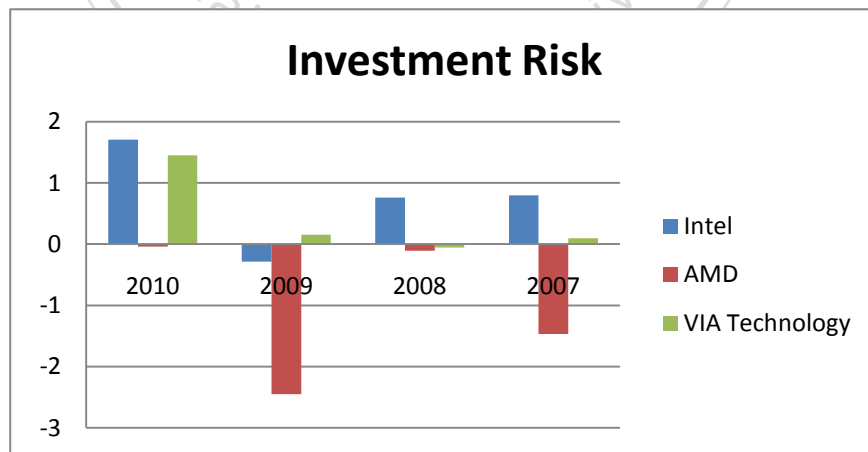
### 3.2.4.2. Investment risk (expansion risk)

Investment risk or expansion risk (Risk\_Inv) measures a company's marginal rate of return of incremental new resources. Investment risk is measured by the additional earnings (loss) divided by additional resources. When the investment risk is greater than 1, that means more than one dollar can be generated by one dollar spent on the resources. In 2010, Intel was very efficient utilizing its added resources. Due to its dramatic increase in non-operating income in 2010, VIA Tech's Risk\_Inv was managed well. The notable is AMD, it was using fewer resources than it did in 2009 and made more EBIT during 2010, see note 1 below.

**Table 21: Investment risk**

Investment Risk	2010	2009	2008	2007
Intel	1.708	-0.285	-0.76 <sub>(1)</sub>	0.797
AMD	-0.04 <sub>(1)</sub>	-2.45 <sub>(1)</sub>	-0.108 <sub>(1)</sub>	-1.467
VIA Technology	1.45	0.154	-0.058 <sub>(1)</sub>	0.095

1. EBIT increased in that year while the resources decreased. Despite the number is negative, but the company actually performed better earning more money with less resources.



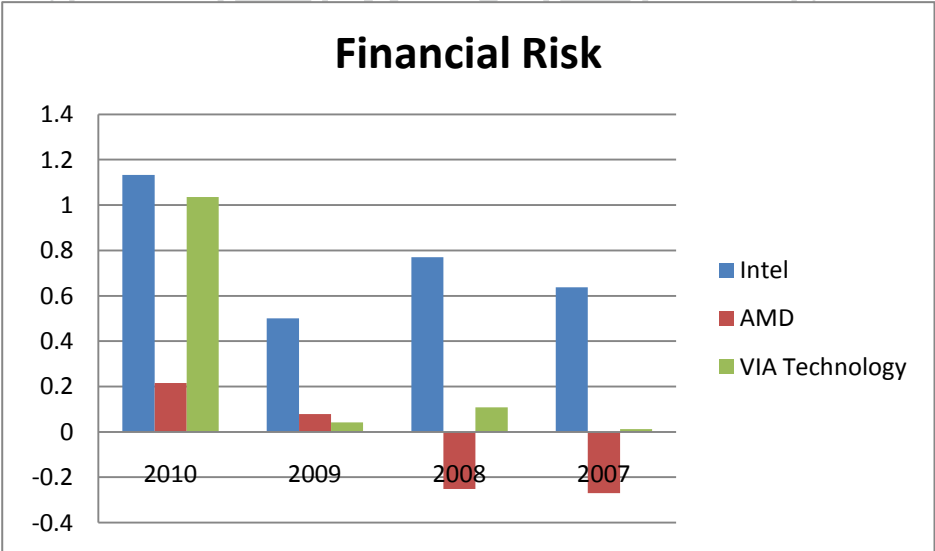
**Figure 22: Investment risk**

### 3.2.4.3. Financial risk

Financial risk is measured by a company’s ability to pay off its debt. Hence, financial risk is given by dividing the EBIT by the debt. The higher the financial risk is, the better the company handles financial risk. Intel had the best financial risk number and it can also be interpreted that Intel has been making the most out of its debt. AMD was losing money in 2007 and 2006, and its debt was relatively high comparing to 2010, therefore it had been at a very difficult financial position but the situation is improving. VIA Technology’s financial risk number took a huge leap in 2010 due to the earnings from the non-operating activities, as discussed in the previous sections.

**Table 22: Financial risk**

<b>Financial Risk</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	1.133	0.501	0.77	0.637
AMD	0.215	0.079	-0.252	-0.27
VIA Technology	1.036	0.042	0.109	0.012



**Figure 23: Financial risk**

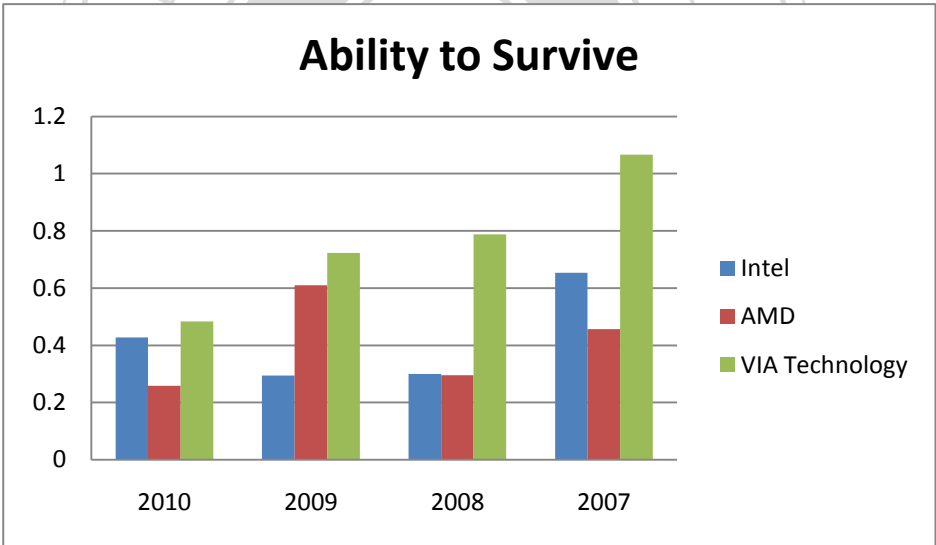
3.2.4.4. Survivability risk

The ability to survive during the economic downturns is measured by whether a company has enough cash on hand to cover the sales, general and administrative expenses. Simply said,

survivability indicates whether a company has enough cash to pay the salary to its employees. The formula is cash over SGA, and Table 23 shows the survivability factor of the three companies since 2006. Surprisingly, VIA Technology has been doing the best job over the last four years in terms of holding enough cash to keep daily operation running. However, the trend is descending and could mean the cash is running low. Intel improves its ability to survive in 2010 after lows in 2008 and 2009.

**Table 23: Ability to survive**

<b>Ability to Survive</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	0.427	0.294	0.3	0.654
AMD	0.259	0.61	0.296	0.457
VIA Technology	0.483	0.723	0.788	1.067



**Figure 24: Ability to survive**

### 3.2.5. Profit Model Map

Figure 25 shows where each company stands in the profit model map. The profit model map is a graphical representation that demonstrates the grade of a company. The profit model map consists of two variables: RoRes on the horizontal axis and  $r_Q$  on the vertical axis, where  $r_Q$  is the extra operating assets required by the resources, and is calculated by change in Q divided by resources. Change in Q is divided by the resources so that it is normalized to be consistent with RoRes (EBIT / Res.).

Profit model map can be divided into 5 regions of different degrees of efficiency and competitiveness. If a company falls in region A, then we can conclude it is a very well-organized, well-managed and very competitive grade A company; in contrast, if a company falls in region F, the company receives grade F and needs improvement in almost every area. The criteria for each region are summarized in Table 24. Companies should target to position themselves in region A.

**Table 24: Profit model map criteria**

Region	RoRes	$r_Q = \Delta Q / \text{Res.}$
A	>15%	$\text{RoRes} > 5 * r_Q$
B	>0%	$\text{RoRes} > r_Q$
C	>0%	$\text{RoRes} < r_Q$
D	<0%	$\text{RoRes} > r_Q$
F	<0%	$\text{RoRes} < r_Q$

As seen from the profit model map in Figure xx, Intel has always been in region B, and almost entered region A in 2010. AMD was a region F and region D company in 2007 and 2008 respectively. It moved to region B in 2009 and has improved its position in the profit model map in 2010. VIA Technology's remarkable income from non-operating activities boosted its EBIT as VIA Tech lands very close to region A in 2010. Besides 2010, VIA Tech has been a borderline

grade C and D company.

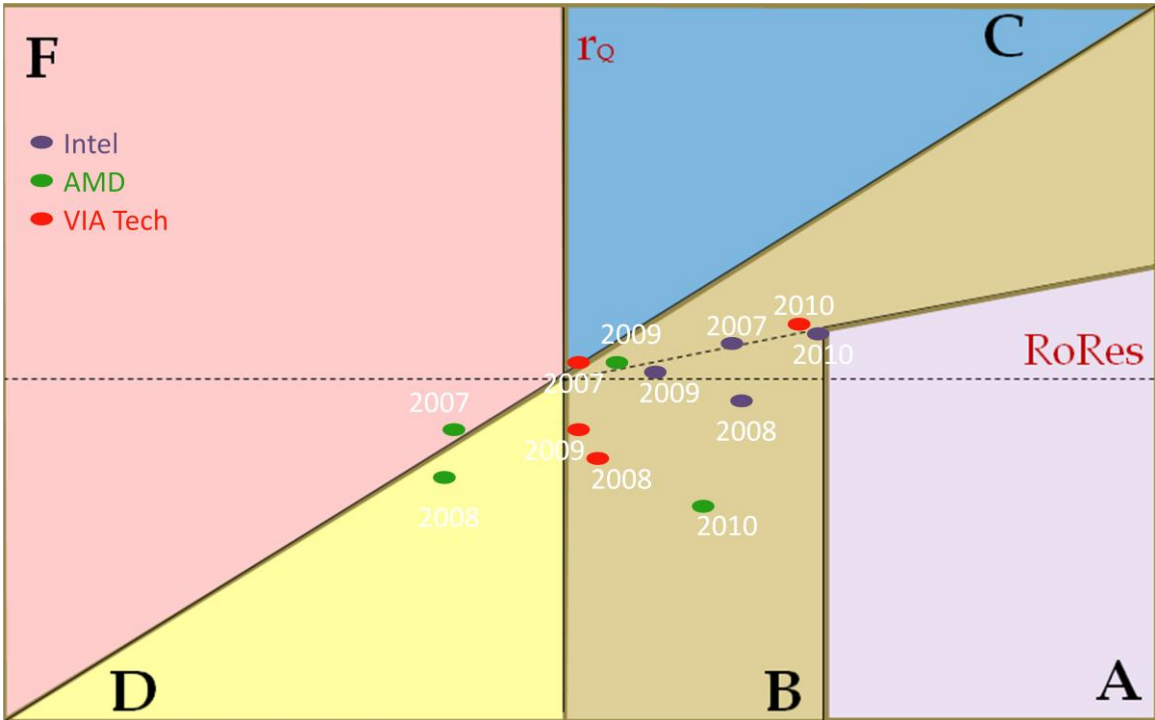


Figure 25: Profit Model Map

3.2.6. Enterprise value

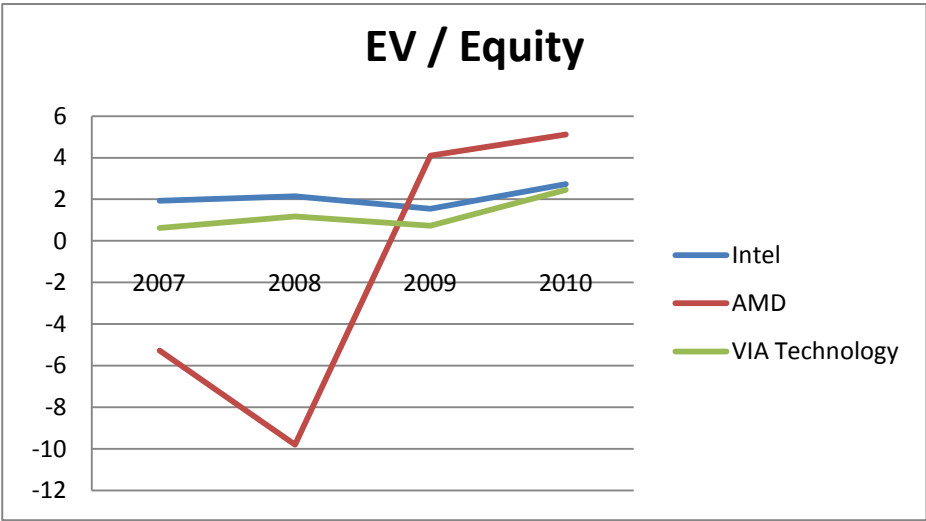
Enterprise value reveals a company’s true value. It is the combination of a company’s current value and its future value. The current value is calculated by cash minus debt minus 70% of required operating asset, therefore the current value can also be seen as the accumulated value from the past. Q is discounted by 30% as the remaining asset may not worth as much as its book value. The future value is calculated by dividing EBIT by the cost of capital. The future value can be said as the forecast of a company’s future profitability, so it is the expectation of the company’s performance in the coming years. In this study, the cost of capital is assumed to be equal to RoRes which is assumed to be 15% as it is a common performance target for RoRes.

Table 25 shows the enterprise value per equity for each of the three companies over the past four

years. Equity is the result of profitability from the past, when a company's EV per equity is less than 1, it is considered as a bad company because its enterprise value is less than its equity.

**Table 25: EV per equity**

<b>EV / Equity</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel	2.738	1.546	2.145	1.925
AMD	5.118	4.096	-9.8	-5.267
VIA Technology	2.45	0.724	1.176	0.624



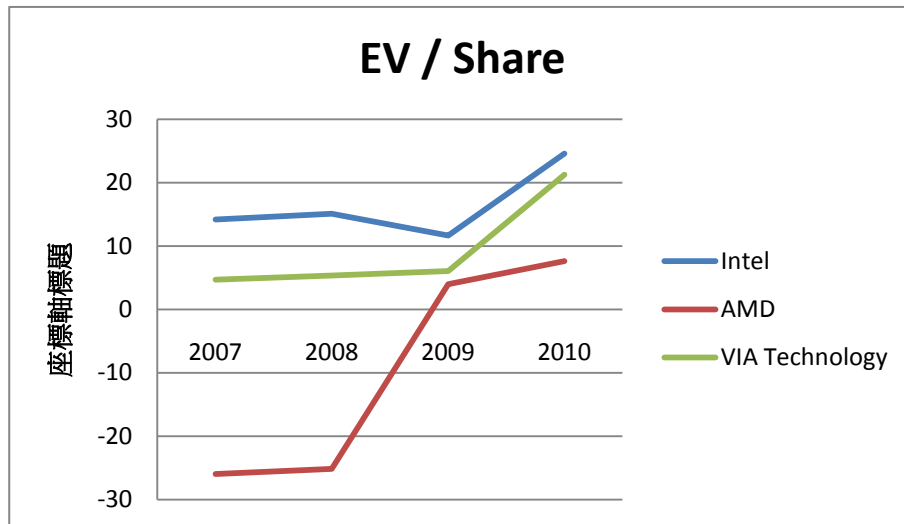
**Figure 26: EV per equity**

Table 25 shows EV per share for the three companies. EV / share can be interpreted as a company's true per share value. It is a more appropriate per share evaluation of a company than equity per share. A lot of times a company's stock price is well below its book value (Eq / share) and its stock price would not catch up with its book value. Then, the company's EV / share value can be compared against its stock price to see if its stock price is really under-estimated or not.

Intel more than doubled its EV / share in 2010. AMD seems to put their worst times behind as its enterprise value per share turned positive in 2009 and almost doubled its 2009 EV / share in 2010. VIA Technology's EV / share had been steady from 2007 to 2009, and it took a huge leap in 2010 due to the dramatic increase in non-operating incomes.

**Table 26: EV per share**

<b>EV / Share</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>
Intel (USD)	24.56	11.67	15.08	14.15
AMD (USD)	7.59	3.96	-25.17	-25.99
VIA Technology (NTD)	21.26	6.06	5.34	4.69



**Figure 27: EV per share**

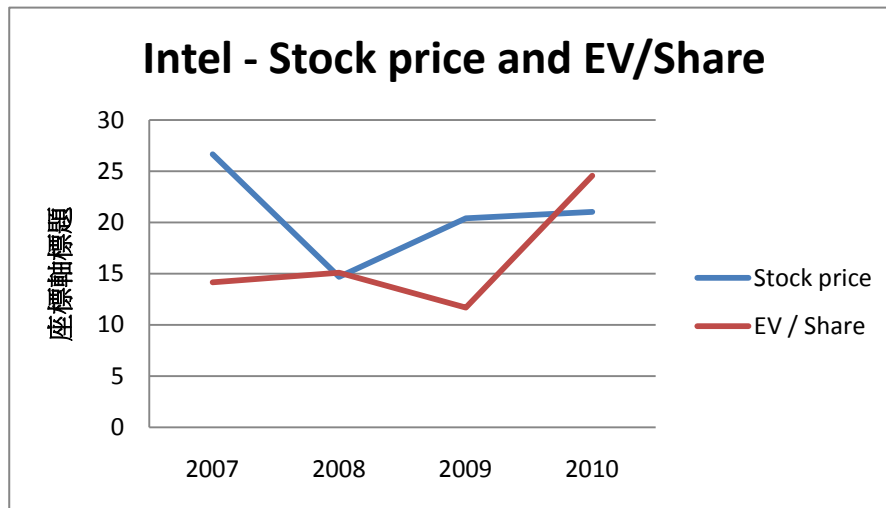
### 3.2.7. EV / share against stock price

Enterprise value reflects a company's true value. It is appropriate to compare the stock price against the enterprise value per share of a company. If the stock price is lower than the enterprise value per share, it is safe to say that the stock price is under-valued, and the stock investors can see it as a buy-in signal; on the other hand, when the stock price is higher than the enterprise value per share, the stock price is said to be over-valued, and the stock investors are better off reduce their shares possessions.

In Table 27, 28 and 29, end-of-year stock prices and EV / share since 2007 are shown for Intel, AMD and VIA Technology respectively. In 2010, Intel's stock price is under estimated; AMD's stocks are slightly over priced; VIA Technology's stock price is considerably over-valued.

**Table 27: Intel's stock price and EV/share**

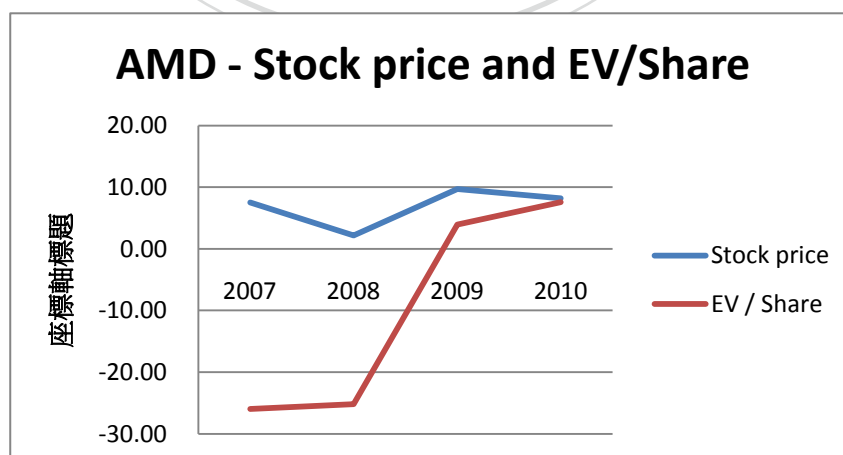
<b>Intel, in USD</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Stock price	26.66	14.66	20.40	21.03
EV / Share	14.15	15.08	11.67	24.56



**Figure 28: Intel's stock price and EV/share**

**Table 28: AMD's stock price and EV/share**

<b>AMD, in USD</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Stock price	7.50	2.16	9.68	8.18
EV / Share	-25.99	-25.17	3.96	7.59

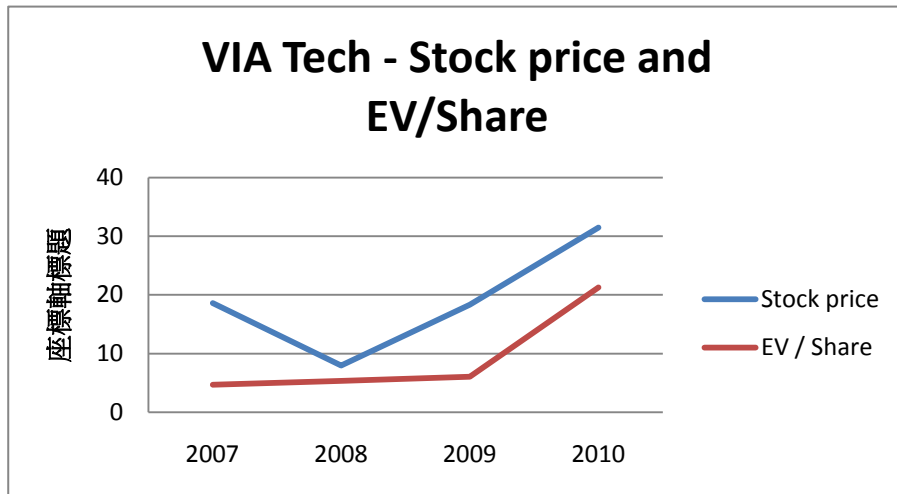


**Figure 29: AMD's stock price and EV/share**

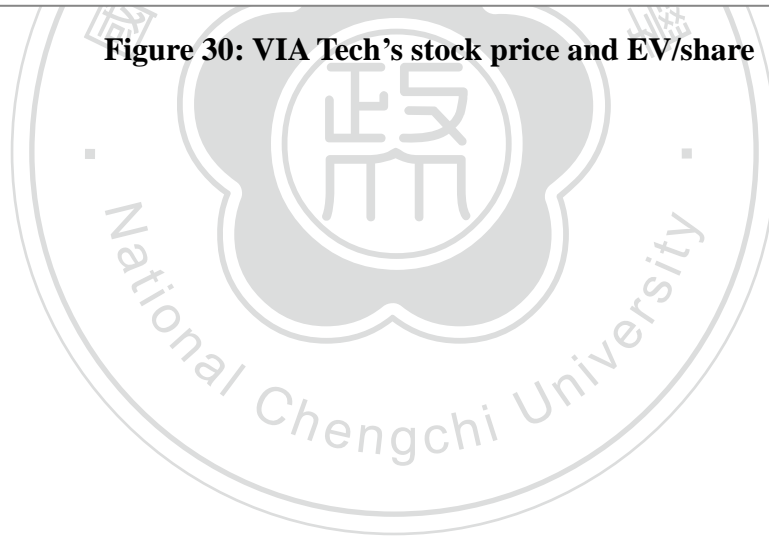


**Table 29: VIA Tech's stock price and EV/share**

<b>VIA Tech, in NTD</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Stock price	18.6	7.93	18.3	31.45
EV / Share	4.69	5.34	6.06	21.26



**Figure 30: VIA Tech's stock price and EV/share**



## 4. Conclusions

### 4.1. Summary of comparison of the metrics

Table 30 shows the ranking of the three companies in some of the important metrics. When a company ranks first in a category, it gets 3 points, the second place gets 2 points and the third place gets 1 point. The ranking is based on the performances of the companies in 2010, and the overall scores for each company are tallied in the end.

**Table 30: Comparison of metrics**

Metrics	Intel	AMD	VIA Technology
Gross profit margin	3	2	1
FCF	2	3	1
FinAct	2	3	1
Growth in EBIT	2	1	3
Competitiveness	2	1	3
ReRos	3	1	2
Management efficiency	2	1	3
Operating risk	3	2	1
Investment risk	2	3	1
Financial risk	3	1	2
Ability to survive	2	1	3
EV/equity	2	3	1
<b>Total</b>	<b>28</b>	<b>22</b>	<b>22</b>

### 4.2. Long term investment advice

According to Table 30, Intel gets the highest score among the three as it does almost everything well and does not get a score of 1 point on any category. AMD and VIA Tech are tied. One thing to note here is the VIA Tech's EBIT had grown in EBIT due to huge increase in non-operating

income, hence its EBIT-related metrics are boosted. Therefore, AMD is given second place because it was relatively more consistent than VIA Tech after the turnaround from the financial losses in acquiring ATI.

In conclusion, Intel is the choice to the investors for long term investment. The reasons are:

- Intel dominates the x86 processor market, and in turn has overwhelming edge in sales (revenue).
- Intel is the best in the business in managing its raw materials, as proven in the gross profit margin.
- Intel is able to be profitable consistently, even during the bad years of 2008 and 2009.
- Intel is capable of utilizing its resources, such as assets and SG&A, to receive favorable returns.
- Intel is almost in region A of the profit model map.
- Intel manages its risks well.
- Intel's stock price is under-valued.

Additional note, as of July 1<sup>st</sup>, 2011, Intel's stock price USD22.53.

### 4.3. Advices to the management team

#### 4.3.1. Advices to Intel

- Intel is the one dominant player in the market, and its financial health is maintained at a very high level, it has been consistently the top of the class over the last few years. The new challenge for Intel will be from the outside of the PC processors market. Smart phones and tablet PCs are growing at a very rapid rate, and they are considered as decent replacements for

computer notebooks.

- Even though the PC market is still growing, the growing rate is expected to be slowed by the emergence of the smart phones and tablet PCs. Intel should put more resources in developing processors and chipsets for low power and high mobility devices.

#### 4.3.2. Advices to AMD

- Visibility of AMD is considerably low compared to Intel's. Intel's famous "Intel Inside" slogan had impressed people around the world, and many of the PC users only recognize Intel and Intel became the only brand they would purchase. AMD should start to spend more on marketing and increase visibility through TV commercials, magazine and internet advertisement.
- Financially, AMD should improve on managing its resources as its RoRes is less than one-half of Intel's. AMD can either increase its EBIT or cut down its resources especially the working capital as its account receivable is more than twice as much as Intel's when comparing against their revenues respectively.
- AMD is also weak in its ability in paying off debts as its financial risk number is the lowest. AMD can either increase its EBIT to cover its debt or decrease its debt because its debt is almost four times of its EBIT.
- In order to increase its operating income, the straight forward way is to increase the revenue and therefore increase its market share. AMD should target more on the performance hungry users because it has advantage in its graphic capability. Another opportunity for AMD to pull-in the schedule for product for the tablet PC market which is growing at a faster rate than most expected.

### 4.3.3. Advices to VIA Technology

There are many areas for VIA Technology to improve on:

- VIA Technology needs to improve on its profitability from the operating activities. Even though the overall EBIT in 2010 grew significantly from 2009, the profit mainly came from non-operating activities such as its real estate and financial evaluations such HTC shares on hand.
- Since the PC processor market is occupied by Intel and AMD, VIA Technology may shift its focus to the niche market. Since VIA has cost advantage, it can enter markets where people's average income is relatively low. For example, countries like India, and Africa. Making white box computers for local channel partners may be a good start.
- Final comment for VIA Technology is that it is transforming to a holding company as its child companies are making positive contributions to their mother company's – VIA – overall profit. VIA Technology may want to consider to utilize its spin-offs and build a vertical supply chain and cut its product prices even further to solidify its place in developing countries.

## 5. Appendix

### 5.1. Glossary

*Central processing Unit (CPU):* the heart of a computer. It is where all computations are performed, and instructions are carried out.

*Chipset:* a group of ICs that handles graphics applications and I/O peripherals. Usually computer chipset refers to the northbridge and the southbridge. The northbridge controls graphics applications, i.e. display; whereas the southbridge carries out input and output functions, i.e. USB.

*Graphics processing unit:* GPU does the computations that are graphics related.

*Platform:* a computer platform is made of CPU and chipset.

*Embedded system:* a system that is designed for a few or specific functions. Examples of popular applications of embedded system are cash registers and ATM machines. A embedded system is different from a personal computer (PC) in the sense that the personal computer is design to meet a wide range of end-user needs.

*Netbook:* a smaller computer notebook that is designed for lower power, lower weight and lower cost.

*Tablet PC:* a new application of computer that is designed to highly mobile. With touch screen technology advances, tablet PC nowadays does not have keyboard and can be used with fingers. A most well-known example is Apple's revolutionary iPad.

*Server:* a server is a system that can be used or accessed by multiple computers, and is designed for the sharing among different users. Server is the one critical part of the CLOUD computing concept.

*CLOUD:* a concept that things that are usually done on a PC are done remotely. For example, an end-user only needs to connect his or her computer to the CLOUD server, and he or she runs programs or stores data on the CLOUD server.

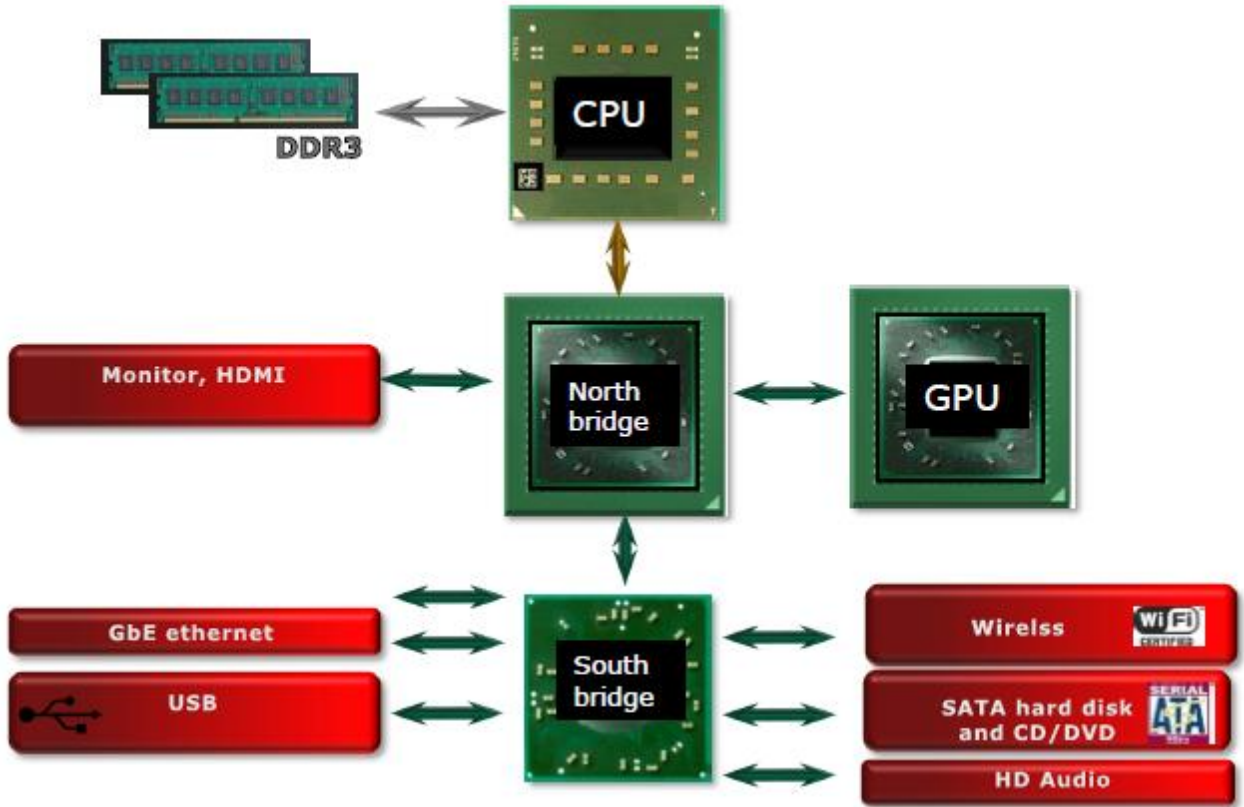
*Ethernet:* a local area network that connects multiple computers together. Most common example is an office Ethernet where the confidential data can be shared with the office.

*X86 architecture:* a family of instruction set architecture. Almost every PC today implements x86 structure.

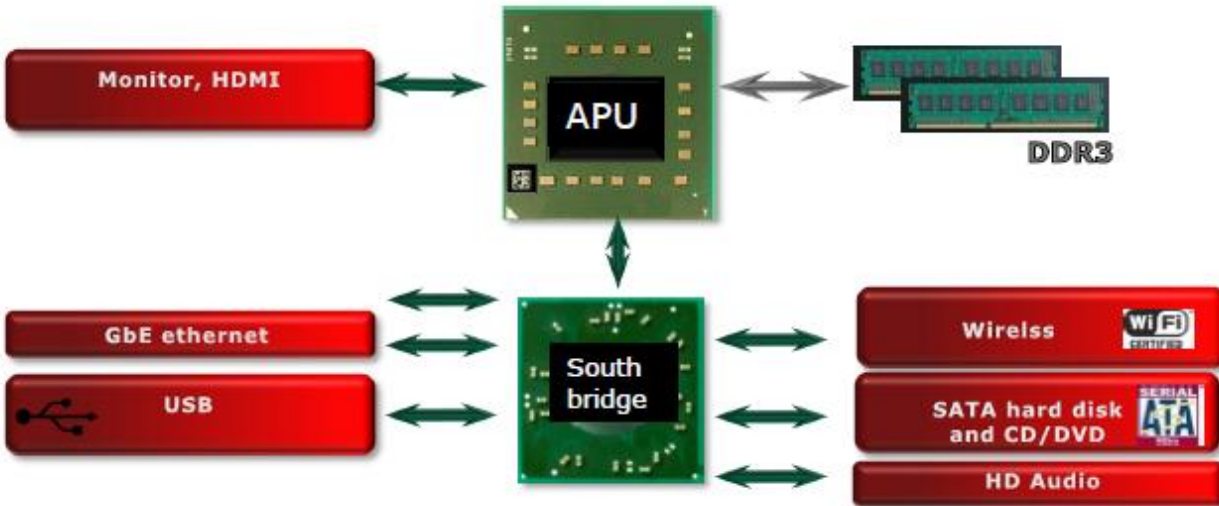
*ARM structure:* ARM structure is mainly applied in embedded system due to its low power characteristics. Almost every smart phone today implements ARM structure.

## 5.2. x86 PC structure

5.2.1. Traditional and common structure

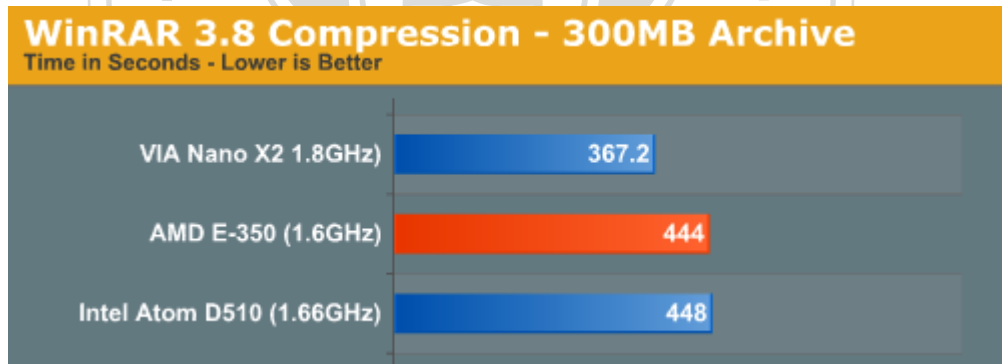
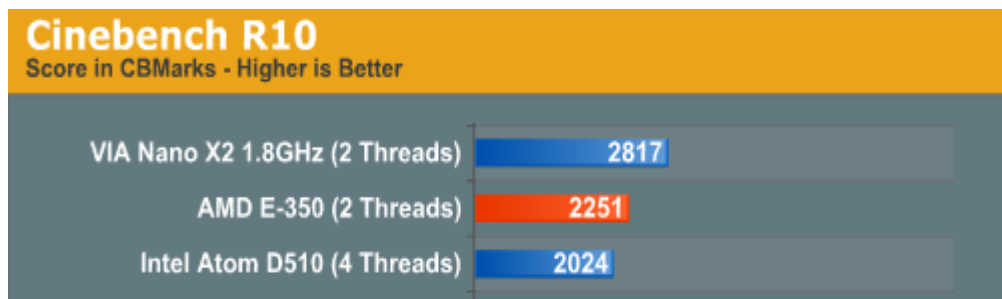


5.2.2. AMD Fusion structure





### 5.3. Additional product performance comparisons



## 5.4. Calculations for Intel, AMD and VIA Technology

### 5.4.1. Intel

Millions USD		2010	2009	2008	2007
1	Revenue	43,623	35,127	37,586	38,334
2	Gross Profit	28,491	19,561	20,844	19,904
3	SG&A	12,885	13,584	11,174	11,172
4	Other exp	18	266	716	516
5	EBIT	15,588	5,711	8,954	8,216
6	Interest payment	109	163	488	793
7	Tax	4,581	1,335	2,394	2,190
8	Net Profit	11,464	4,369	5,292	6,976
9	Cash	5,498	3,987	3,350	7,307
10	A/R + inventory	6,624	5,208	5,456	5,946
11	A/P	2,290	1,883	2,390	2,361
12	Others	35,455	28,558	26,755	27,841
13	PPE	17,899	17,225	17,544	16,918
14	Debt	13,756	11,391	11,627	12,889
15	Equity	49,430	41,704	39,088	42,762
16	Shares	5,511	5,523	5,562	5,818
17	WC	4,334	3,325	3,066	3,585
18	Q	57,688	49,108	47,365	48,344
19	FCF	2,884	2,626	6,271	402
20	FinACT	-1,373	-1,989	-10,228	307
21	CF	1,511	637	-3,957	709
22	EV	135,356.60	64,480.03	83,854.83	82,323.83
23	EV/Share	24.56	11.67	15.08	14.15
24	g(EBIT)	172.95%	-36.22%	8.98%	45.36%
25	WC/Rev.	0.099	0.095	0.082	0.094
26	RoRes	14.27%	5.52%	9.73%	8.83%
27	EBIT/GP	0.547	0.292	0.430	0.413
28	(A/R+Inv.)/GP	0.232	0.266	0.262	0.299
29	Rish_Inv.	1.708	-0.285	-0.760	0.797
30	Risk_Fin	1.133	0.501	0.770	0.637
31	Cash/SGA	0.427	0.294	0.300	0.654
32	EV/Eq	2.738	1.546	2.145	1.925

#### 5.4.2. AMD

Millions USD		2010	2009	2008	2007
1	Revenue	6,494	5,403	5,808	5,858
2	Gross Profit	2,961	2,272	2,320	2,189
3	SG&A	2,339	2,715	3,152	3,131
4	Other exp	-226	-1,107	1,123	1,368
5	EBIT	848	664	-1,955	-2,310
6	Interest payment	199	438	391	367
7	Tax	38	112	68	27
8	Net Profit	431	293	-3,096	-3,379
9	Cash	606	1,657	933	1,432
10	A/R + inventory	1,600	1312	976	1,450
11	A/P	581	647	631	1,009
12	Others	2,639	2,947	2,101	4,961
13	PPE	700	3,809	4,296	4,716
14	Debt	3,951	8,430	7,757	8,560
15	Equity	1,013	648	-82	2,990
16	Shares	683	671	609	606
17	WC	1,019	665	345	441
18	Q	4,358	7,421	6,742	10,118
19	FCF	3,494	-386	280	-1,730
20	FinACT	-4,545	1,110	-779	1,782
21	CF	-1,051	724	-499	52
22	EV	5,184.63	2,654.27	-15,327.23	-15,748.10
23	EV/Share	7.59	3.96	-25.17	-25.99
24	g(EBIT)	27.71%	133.96%	15.37%	-13488.24%
25	WC/Rev.	0.157	0.123	0.059	0.075
26	RoRes	6.18%	3.63%	-10.10%	-10.20%
27	EBIT/GP	0.286	0.292	-0.843	-1.055
28	(A/R+Inv.)/GP	0.540	0.577	0.421	0.662
29	Rish_Inv.	-0.040	-2.450	-0.108	-1.467
30	Risk_Fin	0.215	0.079	-0.252	-0.270
31	Cash/SGA	0.259	0.610	0.296	0.457
32	EV/Eq	5.118	4.096	-186.917	-5.267

### 5.4.3. VIA Tech

Thousands NTD		2010	2009	2008	2007
1	Revenue	5,111	4,893	7,927	14,674
2	Gross Profit	2,050	1,916	2,857	3,454
3	SG&A	2,360	2,406	2,821	4,281
4	Other exp	2,955	2,861	4,483	4,311
5	EBIT	2,342	167	601	84
6	Interest payment	11	44	64	67
7	Tax	200	96	-70	-644
8	Net Profit	-824	-2,834	-4,016	-4,938
9	Cash	1,140	1,740	2,222	4,568
10	A/R + inventory	1,407	1,210	1,345	2,903
11	A/P	955	1,008	750	1,973
12	Others	8,045	6,486	6,933	9,434
13	PPE	1,191	1,316	1,627	1,877
14	Debt	2,260	3,992	5,507	6,965
15	Equity	8,568	5,752	5,871	9,844
16	Shares	987	687	1,292	1,309
17	WC	452	202	595	930
18	Q	9,688	8,004	9,155	12,241
19	FCF	-2,508	-1,683	-930	-5,310
20	FinACT	1,908	1,200	-1,415	-3,211
21	CF	-600	-483	-2,345	-8,521
22	EV	20988.43	4161.73	6,905.17	6,139.80
23	EV/Share	21.26	6.06	5.34	4.69
24	g(EBIT)	1302.40%	-72.21%	615.48%	-80.91%
25	WC/Rev.	0.088	0.041	0.075	0.063
26	RoRes	12.24%	0.95%	2.94%	0.29%
27	EBIT/GP	1.142	0.087	0.210	0.024
28	(A/R+Inv.)/GP	0.686	0.632	0.471	0.840
29	Rish_Inv.	1.450	0.154	-0.058	0.095
30	Risk_Fin	1.036	0.042	0.109	0.012
31	Cash/SGA	0.483	0.723	0.788	1.067
32	EV/Eq	2.450	0.724	1.176	0.624

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