

## BSAS Student Research

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### Analog Devices Inc

**Ticker: ADI**  
**Current Price: \$35.33 (3/16/2007)**

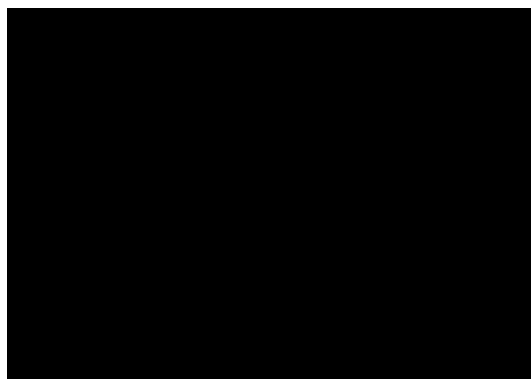
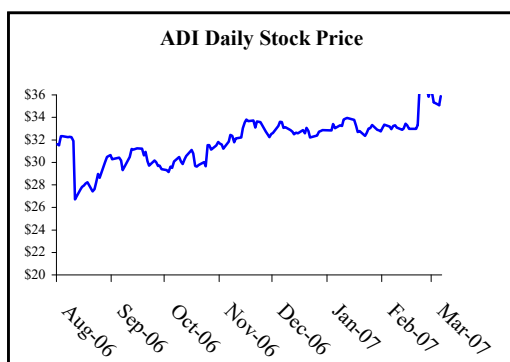
**Recommendation: BUY**  
**1 Year Price Target: \$40.98**

#### Earnings/Share

	Jan.	Apr.	Jul.	Oct.	Year	P/E Ratio
<b>2005A</b>	\$0.28	\$0.31	\$0.32	\$0.18	\$1.08	33.47x
<b>2006A</b>	\$0.32	\$0.39	\$0.39	\$0.39	\$1.48	24.43x
<b>2007E</b>	\$0.44A	\$0.37	\$0.40	\$0.39	\$1.60	22.08x
<b>2008E</b>	\$0.48	\$0.45	\$0.46	\$0.43	\$1.83	19.31x

### Highlights

- **BUY recommendation based on underappreciated strategic position, product & financial strength:** Our analysis provides support for a 1 year price target of \$40.98. We currently rate ADI as a **BUY**.
- **Revenue Drivers - Amplifiers and converters continue to shine:** Analog is core to the ADI product line and our bottoms-up analysis projects strong growth in this business. New Industrial applications and burgeoning Consumer demand are driving converter and amplifier growth.
- **Margin Leverage:** Costs and margins are expected to improve across most of the ADI product line. We expect this will continue over the short and long term as the company tackles operating expenses.
- **Inventory cycle at beginning of turnaround:** Recent inventory concerns appear to be overblown, notwithstanding a possible obsolescence write-off in 2007, with turnover expected to increase throughout F2007.
- **What-If Strategic Alternatives:** Our analysis concludes an LBO and/or divestiture of DSP's are not likely.



## Investment Summary

**BUY recommendation based on underappreciated strategic position, product & financial strength:**

Our fair value of \$37.47 and 1-year target price of \$40.98 is based on DCF and comparable multiples valuations with equal weight applied to each approach. ADI currently has 16% upside potential from its March 16, 2007 closing price of \$35.33.

**Revenue Drivers - Amplifiers and converters continue to shine:** Across both the analog and digital portfolios, we believe that analog experienced the low point of its sales cycle in mid-2006 and growth should persist for the near and intermediate term. New catalysts include Consumer mass adoption of High-def (TV, DVD players, HDMI interface), mobile TV, and broadband wireless for cell phones and new high end applications in the Industrial segment such as intelligent battery management and medical ultrasound. Other strong revenue drivers include BlackFin DSP and MEMS accelerometer products, which have become 'best-in-class' solutions for general purpose (BlackFin) and niche applications including the Nintendo Wii.

**Margin Leverage:** Costs are decreasing and margins improving across most of the ADI product line. We expect this will continue over the short and long-term. Management is focusing on 30% operating margins which we believe will be attainable through manufacturing and other efficiency efforts throughout the company. These benefits will drive faster earnings growth in the F2007/8 timeframe and continue to improve out to 2012.

**Inventory Cycle at beginning of turnaround but possibility of writeoff exists:** Days of inventory outstanding have peaked and are expected to hit historical averages as increased demand, fab consolidation, and a possible writedown should reduce days out. Our analysis has uncovered an unexpected inventory write-down upcoming in 2007 related to lead-free initiatives. ADI still has non-RoHS compliant goods that are no longer demanded by customers due to regulatory restrictions in Europe and China.

**What-If Strategic Alternatives (Leverage Buyout (LBO)/ DSP Divestiture):** Historical analysis of other LBO's indicates ADI is not a likely target. This analysis considers LBO premiums traditionally paid and possible divestitures. We do not recommend a divestiture of DSP's as we believe this would do little to drive the stock.

**Financial Flexibility:** Increasing dividends and an expansion of stock repurchases by \$1B leave ample cash for additional dividend increases including possible one time dividends, providing a potential floor for the stock.

## Valuation

### One year Price Target: \$40.98 Per Share

We built our valuation models using two traditional methods, discounted cash flow and comparable multiples.

#### Discounted Cash Flow Analysis

We used our cyclical revenue and income model to project ADI's Free Cash Flow over the next 6 years, which we discounted at ADI's WACC to arrive at a fair share price. We projected Net Working Capital and CapEx expenditures by assuming common size growth of balance sheet items as a % of Net Revenue. We used a combination of methods to estimate Terminal value in 2012.

- Perpetual Growth method assuming a 5% perpetual growth rate.
- Comparable multiples assuming that the EV of the company in 2012 will be close to that predicted by the industry EBITDA multiple (EV = 9.8xEBITDA).

By equally weighting these two methods, we arrived at a DCF fair value for ADI's shares of \$41.07. See Figure E for detailed analysis.

#### Comparable Company Analysis

Our comparables consisted of large cap semiconductor firms with a significant percent of overall sales from analog products. Three metrics stand out from our analysis, that of Price to Forward Earnings, Price to Book Value, and Market Cap to Free Cash Flow. ADI currently trades at a discount to these first two multiples. Consensus forward earnings for several of ADI's comparable companies are *lower* than previous year's actual earnings. This is partially explained by slower forecasted semiconductor sales as well as inventory concerns. Finally, ADI trades at a large premium when compared to its implied price using Market Cap to Free Cash Flow which can be explained by ADI paying off \$115M of their tax liability in 2006 which consumed a large portion of Free Cash. Using a comparables approach to valuation we have obtained a target price per share of \$33.87. See Figure F for additional details.

#### One Year Price Target

Equally weighting our DCF and comparable target prices results in a combined target of \$37.47. Assuming value appreciation at the cost of equity (Ke), this translates into a one year price target of \$40.98.

<u>Valuation Method</u>	<u>Price</u>	<u>Weight</u>
DCF	\$41.07	50%
Comparable Company Analysis	\$33.87	50%

Target Price	\$37.47
1 Year Price Target	\$40.98
Today's Price (3/16/2007)	\$35.33
Expected 1 Year Return	+15.99%

#### PEG ratio

The P/E to Growth ratio is a useful tool to determine how ADI sits with respect to its current price and future growth potential. ADI current trades at a trailing P/E of 22.4 as does the semiconductor industry as a whole. However, we estimate ADI's expected EPS CAGR from F2007-2010 to be 12%. Compared to the semiconductor industry's expected growth of 9% (analog 11%)<sup>1</sup>, ADI's PEG is 1.87 vs. the industry's 2.49 vs. the analog segment's 2.04. By this metric ADI is slightly undervalued.

<sup>1</sup> SIA Forecast: Microchip Industry Will Reach \$321 Billion in 2009, [http://www.sia-online.org/pre\\_release.cfm?ID=420](http://www.sia-online.org/pre_release.cfm?ID=420)

## Business Description

Headquartered in Norwood, Massachusetts, ADI produces analog and digital integrated circuits (IC). These products serve a global customer base with distribution across continents. Supporting their global business, ADI employs approximately 9,800 people and maintains sales offices worldwide. It manufactures the majority of its own integrated circuits and has facilities in Ireland, U.S., and the Philippines for this purpose.

ADI IC's manipulate real-world inputs like sound and temperature, which cannot be accomplished with a stand-alone digital chip. Real-world signals are converted into digital signals and in some cases, later converted back to analog. For example, a mobile phone will take an analog signal (voice) and convert it to a digital signal for transmission over the cellular network. Demand for analog IC's is widespread because a large number of devices require the analog-digital-analog conversion in order to work efficiently and to take advantage of advancements in digital technology.

ADI reaches its customers through a direct sales force, distributors, independent salespeople, and online. ADI customers operate in the industrial, communication, consumer, and computer markets; therefore ADI's business is directly linked to the trends in each of these markets.

"Diversified" is an efficient way to describe the ADI business. ADI's diversified product line has over thousands of SKU's and their twenty largest customers accounted for only 10% of their revenue<sup>2</sup>.

Lastly, ADI has a deep knowledge base with over 1,202 patents, evidence of the company's focus on R&D.<sup>3</sup> This manifests itself as a competitive advantage and can benefit the top line as with the recent Q1 licensing fee of \$35M.

ADI's revenue has been and will continue to be driven by the following product segments. Please see our detailed revenue model, Figure D.

### **Premium Analog Converters and Amplifiers**

ADI's namesake segment is its strong suit, and offers its greatest opportunity for growth in the next 5 years. Increased demand for analog is everywhere but especially apparent in the Consumer and Industrial segments. It is becoming more prevalent in high-end DSP applications (TVs, personal media devices) which will drive demand for analog converters and amplifiers. We see revenue growth for the Analog Converter and Amplifier segment remaining strong in the 10% to 15% range for the next 3 years.

### Margin erosion?

ADI's analog products are highly respected among professional EEs as high end products – in polls of electrical design engineers, ADI's brand normally ranks as the #1 or #2 choice (source: EE Times & ADI presentation). ADI focuses on developing products for difficult applications for which commodity products are inadequate. Because of this, ADI is able to sell its products at a price premium over other devices. As long as ADI keeps its R&D focused on analog, we believe ADI is not at risk of losing this price advantage. Therefore we don't see price and concomitant margin erosion for analog products in the near term.

In fact, we see gross margin for analog product improving slightly over the coming years as the company's recent fab closures and consolidations start to generate cost savings from higher utilization, increased manufacturing productivity, and improved efficiencies in all areas of the company.

### **Explosive growth in MEMS accelerometers (the Wii and more)**

This product category includes ADI's most widely publicized new product – the MEMS accelerometer used in the new Nintendo Wii system. Wii sales have exploded due in part to widespread word of mouth regarding the Wii tilt and roll controllers. Wii is currently outselling 2 to 1 its closest competitor, the PS3.

We mustn't forget the other uses of MEMS devices, historically 5% of ADI's total revenues pre-Wii. MEMS accelerometers are also used in automotive airbag systems, admittedly a more mature and price sensitive application. But there is another rapidly expanding application – for gyroscopes used in GPS navigation systems. As in-car navigation systems continue to expand, this will drive more demand for this

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<sup>2</sup> ADI 10K October 20, 2006, page 16.

<sup>3</sup> ADI spends approximately 15% of sales on R&D and as of October 28<sup>th</sup> held 1,202 patents with 513 non-provisional patents pending. ADI 10K October 20, 2006, page 14.

product segment. We estimate 22% growth in the Other Analog product segment for F2007, which we conservatively estimate will taper off to 12% Y/Y growth in 2012.

#### **Wireless Chipsets**

Ultimate disposition of the wireless chipset segment will make little difference to ADI's value. The wireless chipset business and speculation on its ultimate disposition dominates recent Wall Street analyst reports and conference calls. While this is an interesting topic for the industry as a whole, our analysis shows this segment (<10% of F2007E revenues) makes little difference to the ultimate value of ADI. ADI's business is about premium products, not commodity handsets.

#### **Blackfin Processor – General Purpose DSP's**

The ADI Blackfin processor is often highlighted in industry trade journals such as Design News and EE Times. For example, a recent Design News article<sup>4</sup> discusses the ADI Blackfin processor as a new solution for car entertainment systems. With rapid change in multimedia technologies and new products – MP3 players, DVD players, satellite radio – that are now finding their way into cars, automotive engineers are wary of designing conventional stereo systems (radio, tape decks, CDs) into cars. Instead they are moving toward USB solutions, replacing the old component system with a central processing system into which users plug their own devices (iPod, satellite radio, DVD). ADI's versatile Blackfin family supports this trend with a single processor. In addition, Blackfin is blazing onto the Web as the central processor in the \$150 LiteComputer which exclusively utilizes Internet applications such as Google Apps Premier. This market is expected to grow as online collaboration becomes essential for business and home users. We see the General Purpose DSP segment growing by 8% to 10% Y/Y through 2011.

## **Industry Overview and Competitive Positioning**

The semiconductor industry is characterized by rapid technology changes, specialization, and expanding demand. To avoid some of the competitive pressures of the industry, some companies have taken specialization strategies and many continue to invest heavily in R&D (upwards of 15% of sales). Customers have weak to strong influence in the industry depending on the sector in which they operate. Suppliers in this industry have little influence because of the commodity nature of their supplies. Barriers to entry in this industry are high because of the capital required to construct the necessary manufacturing facilities and the knowledge base required by engineering staff. Note that outsourcing is playing a larger role as firms like ADI outsource 20% of their digital processor production. The critical talent of analog engineering represents the largest barrier to entry as these engineers are in perennially short supply. ADI addresses this with competitive compensation and a non-management career path for engineers so they won't feel required to move up the organization to be successful.

#### **Industry Trends: Down period looks to be over, strong demand in Analog/Asia-Pac**

The industry has shown improvement over the last several quarters. Granted, late 2006 and early F2007 statistics would be hard-pressed to perform worse than the previous 8 quarters. Improved demand from Asia-Pacific should help maintain growth along with stabilization of average selling prices (ASP). The Asia-Pacific region is expected to outpace all other regions with average annual revenue growth of 16.5%. The expected growth rate for all regions can be found in Figure G (*Global Chip Consumption, By Region*).

Highlighting the analog segment of semiconductors, the *S&P Industry Survey* produced by the Semiconductor Industry of America (SIA) has projected growth of 11.5% through 2009 for the analog sector. Most analog products are "sole-sourced" meaning only a handful of companies are capable of offering similar products. Analog products also experience less competition from Asia and are slightly less-commoditized than other semiconductor applications. These factors have made the analog market more stable than the rest of the semiconductor industry.

#### **ADI outpaces industry**

ADI's ten year revenue growth rate of 12.3% has outpaced the broader analog semiconductor market which has grown at 10.6% annually. The market consists of large analog designers and manufacturers including Texas Instruments, National Semi, Maxim, Linear Technology, and Microchip. ADI competes using a strong brand, talent retention, and heavy investment in R&D and Fabrication improvements.

<sup>4</sup> Design News January 2007, Figure M

Historically, ADI has invested more than its competitors in R&D averaging 19.1% of sales over the past decade while TXN, LLTC, and MXIM have invested 15.0%, 11.9%, and 18.3% respectively. In F2006, ADI's R&D spending was 21.7% of sales. Additionally, ADI invests more in SG&A than the industry as a whole, with a ten year average of 14.3% of sales (15.3% in F2006) versus an industry average of 13.0%. This also indicates room to potentially reduce spending growth to drive operating margin expansion, particularly in R&D where ADI is finishing the reorganization of product development and support.

## Financial Analysis

### **Diverse end market applications driving renewed interest in ADI's product line**

#### Revenue

Growth will be driven from analog products and we see the core portfolio of converters and amplifiers continuing to represent the majority of sales.

- We expect the converter product line to grow at 10% CAGR from F2007-2009 and amplifiers to grow at 12% CAGR during the same period. We estimate converters growing from \$1,146M in F2007 to \$1,387M in 2009 and amplifiers from \$612M to \$767M over the same period.
- The power management products have experienced stagnant (or negative) growth the past several years but we believe F2007 will begin the long recovery period for stabilizing and regaining market share. We initially expect sales to grow 7% in F2007 and then 10% in F2008 and F2009. We expect sales of \$235M in F2007 growing to \$284M in 2009.
- The historically volatile Other Analog segment includes MEMS and should be the high growth engine as new applications are found for these components. We expected revenue to grow at a 20% CAGR from F2007-2009 from \$368M in F2007 to \$525M in 2009.
- General Purpose DSP's have accelerated growth recently to 17% Y/Y in FQ107 but we expect this to slow down to 10% Y/Y in F2007 to 2009.

For Q207, we expect revenues of \$691.4M (flat Q/Q considering one fewer week), gross margin of 58.7%, SG&A of 15.5% and R&D of 21.5%.

For the full fiscal year, we expect revenues of \$2.83B (up 11% Y/Y), adjusted gross margin of 59.6%, SG&A of 15.5% and R&D of 21.5%. Bottom line, for F2007, we expect EPS of \$1.60 (up 8%). Note that net earnings are affected by an increase of the effective tax rate from 17.2% in 2006 to 26% in F2007 and beyond.

#### Confidence in Gross Margins

ADI management expresses confidence in its long term operating model of 60% gross margins and expects to reach this target in FQ108. The company does not expect to see the full benefit of its recent restructuring efforts (California fab shutdown) on gross margins until it works through its current 120 days of inventory.

Though ADI does not publicize its gross margin by product line, we estimated gross margin by product segment by using a variety of information – ADI management's own 'relative ranking' of product profitability from highest to lowest, a review of the cost structure of each product type (in-house fab of analog components vs. outsourced DSP's), and a review of historical product mix and total gross margin, to arrive at an estimate for GM% for each product type. We then used our revenue forecast out to 2012 and estimated revenue mix to project ADI's GM% in Figure D.

#### Operating Margins

The greatest area for margin improvement is in continued efficiencies in R&D and SG&A. Management's stated goal of 30% operating margins is achievable through continued optimization in R&D by the restructuring of product development and co-development of projects. ADI historically spends 19.1% on R&D which has trended up to 20.78% in recent years. We believe the company can improve by 1-1.5% points and still keep its competitive R&D edge. SG&A has smaller areas for improvement and may yield 0.5-0.75% points of improvement if ADI is able to implement cost savings measures. These short term measures will help in the 2007/8 timeframe and we believe the company can expand to its goal of 30% operating margins by 2012.

### Earnings

After the effects of the increased effective tax rate in F2007 and beyond, we see diluted earnings of \$1.60 in F2007, \$1.83 in 2008, and \$2.06 in 2009. Overall this is an 11-12% CAGR for EPS from 2006-2012. These are based on 349.5M outstanding shares<sup>5</sup>.

Stock-based compensation has had a material effect on GAAP earnings and is expected to continue to have an impact as ADI relies heavily on options for compensation. Currently there are 82.5M options outstanding that are vested which represent \$156.6M of unrecognized compensation.

### **Balance Sheet & Financing**

Abundance of cash and short term investments totaling \$1.95B have resulted in continued increases to its quarterly dividend and increases in the share buyback program.

### Cash use

ADI has increased its dividend consistently over the past several years to a recent \$0.18 per quarter. The company also recently expanded its stock repurchase program by an additional \$1B which we see as a positive signal from management. We believe ADI to be in sufficient position to accommodate these aggressive repurchases and believe there is room for further dividend expansion, possibly including a large one time payout. Ample cash is available for strategic acquisitions as well.

### **Cash Flow**

We forecast Free Cash Flow directly off of EBIAT and add back depreciation, subtract increases in Net Working Capital, and subtract CapEx. We believe ADI will generate \$405M of Free Cash Flow in F2007, \$443M in 2008, and \$515M in 2009. Management has guided CapEx back to historical trends in F2007 after the plant closing in California in 2006.

### **Ratio Analysis**

- Profitability: All traditional profitability metrics have show increases over the past decade. Return on Assets, Capital and Equity, at 10.7%, 12.6%, and 16.7% respectively for the most recent twelve months are all 1-2% points greater than its ten year average which implies ADI management continues to improve resource utilization. Given the company's margin goals, there is more room to go.
- Margins: Historical Gross Margins continue to improve Y/Y with the most recent twelve months hitting 59.6%<sup>6</sup>, 5.6% points higher than the ten year average and 9.3% points of improvement from a decade ago. EBIT Margins continue to greatly improve as well with significant improvements up from 10.6% in 2002 to 26.6% in the most recent twelve months.
- Asset Turnover: ADI's improvement of existing Fab facilities has greatly expanded its Fixed Asset turnover from 2.0x in 2002 to 4.6x in the most recent twelve months. Current assets including accounts receivable and inventory have stayed constant with AR turnover around historical 8x and inventory turnover at around historical 3x. Notable here is ADI's increase in average days of inventory outstanding. This is near historical highs currently at 127.5 days with turnover near a low of 2.9x. This should improve with the recent closure of its California fab facility and an increased demand cycle.
- Liquidity: ADI has seen few changes in its current and quick ratios which are near historical averages of 6x and 5x respectively. These ratios represent little concern as they are solid (typical for semiconductors) because of the large balance of cash and short term investments.

### **Cyclicity**

Evaluating historical data, we observed that cyclicity of ADI is different from that of the semiconductor industry in general and has reduced in comparison with respect to its own stock price history (Figure O). This may be attributed to diversified portfolio of products, heavy Industrial exposure (44%) in comparison with other semiconductor companies, increasing reliance on fabless manufacturing, and heavy R&D investment which helps bring out high-margin products regularly.

Among the determinants of the semiconductor industry cyclicity, Sales, Cash Flow, Dividends, Gross Margins, GDP, Inventory and Fab-utilization ratios have been used predominantly. Liu, Wen-Hsien observes that Inventory and Fab-utilization ratios play a significant role in determining a semiconductor cycle<sup>7</sup>.

Since the closing of the California fab facility, the Fab-utilization is expected to go up in the remaining three fab facilities owned by ADI. Also, ADI's Book-to-Bill ratio rose above unity in Q107 leading ADI to believe

<sup>5</sup> Note that the effects of future share repurchases or share issuance for option compensation are not included when calculating future diluted EPS

<sup>6</sup> Excludes Q107 one time license fee \$35M

<sup>7</sup> Liu, Wen-Hsien, 2005. "[Determinants of the semiconductor industry cycles](#)," *Journal of Policy Modeling*, Elsevier, vol. 27(7), pages 853-866

that the inventory correction issues observed in last quarter of 2006 may be improving. ADI also observed order rate improvements both in OEM and distribution channels in Q107.

Based on these observations, we believe that ADI is trending upwards in its current cycle. These observations are reflected in our financial models.

#### **Leveraged Buyout**

Recent buyouts in the semiconductor sector (Philips Semiconductor and Freescale Semiconductor) have increased speculation on whether ADI is a possible LBO candidate.

Based on the factors such as steady cash flow, divestible assets, minimal debt, strong market position, viable exit strategy etc. which are typically used to screen potential LBO candidates, ADI ranks high on the list of possible LBO targets. ADI's ailing DSP segment, huge cash on its balance sheet, strong analog position and steady cash flow have been used as reasons why ADI is a suitable LBO candidate. However, considering its current market cap, an LBO deal would be very expensive for private investors. Our analysis shows that even with a conservative premium of 20% of the current trading price, investors would be able to realize a very low IRR upon exit.

In fact even with a very conservative offer premium, private investors must exit at a huge premium (25% over F2011E EBITDA) to realize a conservative IRR of 15%. In addition, the investors will have a difficult time raising 10X EBITDA as debt considering 7X EBITDA is the norm. Due to these unattractive terms and potential difficulties in raising funds for the buyout, we conclude that a leveraged buyout will not happen for ADI, although this viewpoint may differ from the Street. Figure N details our analysis.

#### **DSP Divestiture**

ADI has struggled in the past few years to reinvigorate its DSP segment. The company has increased its investment in this highly competitive segment through acquisitions in an attempt to reverse its downturn. We believe that the DSP segment will see benefits of these investments in 2007 and 2008. Key investments focusing on China's emerging mobile markets (TD-SCDMA standards, mobile TV) may not bear fruit till late 2008 and 2009 due to government controls in the Chinese economy. We believe that if the DSP segment doesn't evolve as anticipated in the coming quarters, ADI may divest its DSP segment.

A DSP divestiture may be advantageous for several reasons. First, our analysis shows an immediate increase in overall gross margins to 61.6% in F2007 to 62.2% in 2008 and beyond. Second, it will increase revenue growth from 11.7% CAGR to 12.0% from F2007 to 2011 but at a cost of reduced diversification and may even slow growth as products are often sold together. Finally, management can increase focus on analog segments that are losing market share (e.g., power management).

While a divestiture could net \$800-850M<sup>8</sup>, we believe this would affect complementary analog sales and may prohibit further product expansion areas. Therefore we do not recommend that the company divest DSP's.

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<sup>8</sup> Using a 1.7x sales multiple



## Investment Risks

### **Product Mix doesn't favor Margins**

ADI's fastest growing market segment the past several quarters has been Consumer, a segment where the majority of products are historically cost sensitive. At 20% of revenues, additional growth may impact gross margins. Additionally, overall MEMs growth is expected to be in the mid 20% range the next several years with margins much lower than the premium analog products. Currently this is offset by the Industrial segment (44% of revenue) which is growing at 13.5% and having a large impact. If the Industrial segment experiences slower growth, then lower margin consumer products will affect the bottom line.

### **Inventory concerns remain**

Despite management and industry comments that the inventory glut may be receding, we still see this as an issue that may prohibit further earnings growth. ADI continues to have 127+ days of inventory outstanding which is a historical high for them, creating a five year low in inventory turnover of 2.9x. Although comparable companies are near historical averages, ADI has the greatest amount of days out. This coupled with a possible write down represent one of our larger risks.

### **RoHS inventory writedown**

Watch for a surprise inventory write-off in 2007 related to the European RoHS (Reduction of Hazardous Substances) initiative. This new initiative took effect in Europe in 2006 and bans importation of all devices containing lead, and other hazardous chemicals that were historically common. ADI has converted the majority of its products over to compliant lead-free devices, but non-compliant finished goods inventory is still in the pipeline. ADI management addresses this in its 2006 annual report, yet stresses that the initiative currently only applies legally in Europe.

What ADI isn't saying is that customers in the US and Asia don't want the non-compliant products either. Many electronic devices are marketed globally and it's logistically impractical to purchase RoHS compliant components for European-bound products and non-RoHS compliant products for elsewhere. Customer engineers are choosing to go RoHS complaint across the board, to minimize SKUs and to prepare for the eventuality that the US and Asia will also go RoHS. China is beginning to implement a RoHS initiative that is stricter than Europe's, and states in the US such as California are looking at implementing this as well. Any non-RoHS components still in the pipeline will be difficult to sell.

The company has not commented on the value of non-RoHS compliant stock still in the pipeline. But a stock check of Newark Electronics (ADI distributor) shows 25% of the 1200 stocked part #s are still non-compliant, also 25% of the total value. When ADI realizes this inventory hasn't been moving anymore, we believe the company will need to take a one-time write-off for product obsolescence.

Though this write-down will have little long-term effect, when the surprise does occur the market may react negatively. We believe this is not expected by the Street.

### **Competitive Risk**

The company competes with well-established industry players like Texas Instruments, Maxim and Linear Technology. This raises the specter of price pressure and heightens the importance of timely R&D as missed product cycles could result in market share loss and downward earnings revisions.

### **Continued loss of market share in Power Management**

ADI continues to slip in market share in this segment which makes up 8% of sales. ADI has also been late entering the fast growing portable power management (PPM) market giving up critical share to BRCM and TXN. Over a year ago ADI hired a key manager in this segment from NSM, that being Peter Henry. If this new team can deliver a portfolio of high-end PPM products to the Consumer and Computer market segments, we believe this will stem share loss and could increase EPS by an estimated \$0.014 in 2008, \$0.028 in 2009, and \$0.054 in 2010. Otherwise, ADI faces a large uphill battle and alternatively should increase spending in the Industrials segment instead of power management.

Appendix

Figure A: 5-Year Stock price history



Source: Big Charts

**Figure B: Income Statement**

\$ In millions

<b>ANALOG DEVICES INC</b>													
<b>Consolidated Statements of Income</b>													
<b>For Period Ended Oct 30</b>	<b>In Thousands Except Per Share Amounts</b>												
	<b>10/30/2004</b>	<b>10/30/2005</b>	<b>10/30/2006</b>	<b>1Q07</b>	<b>2Q07</b>	<b>3Q07</b>	<b>4Q07</b>	<b>FY07(E)</b>	<b>FY08(E)</b>	<b>FY09(E)</b>	<b>FY10(E)</b>	<b>FY11(E)</b>	<b>FY12(E)</b>
Net sales (generated from ByProduct revenue model)	2,633.80	2,388.81	2,573.18	691.61	691.37	764.67	749.91	2,862.56	3,196.30	3,522.31	3,821.10	4,087.30	4,291.67
Cost Of Sales	1,080.00	1,005.97	1,067.04	274.59	285.59	313.20	309.86	1,156.13	1,271.61	1,398.54	1,516.90	1,623.85	1,705.04
Gross Profit (from revenue model)	1,553.80	1,382.84	1,506.14	417.02	405.78	451.47	440.05	1,706.43	1,924.70	2,123.77	2,304.20	2,463.45	2,586.63
Research and development	514.44	497.10	558.46	143.90	148.64	164.40	161.23	615.45	671.22	739.69	802.43	858.33	901.25
SG&A	340.04	338.28	394.09	104.68	107.16	118.52	116.24	443.70	495.43	528.35	534.95	531.35	557.92
Special charges	0.00	314.80	1.79	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EBIT	699.32	232.67	551.81	163.24	149.98	168.55	162.59	647.29	758.05	855.74	966.82	1,073.77	1,127.46
Operating income	735.37	304.36	651.98	195.54	173.65	190.22	182.26	744.60	861.38	969.95	1,096.06	1,222.18	1,297.96
Depreciation	149.92	153.18	166.85	41.71	40.35	37.61	36.25	155.92	170.68	186.21	199.97	211.71	220.01
EBITDA	849.24	385.85	718.66	204.96	190.32	206.16	198.83	803.20	928.73	1,041.95	1,166.79	1,285.48	1,347.47
Interest expense	0.22	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Interest income	(36.05)	(71.69)	(100.17)	(32.00)	(23.67)	(21.67)	(19.67)	(97.31)	(103.33)	(114.21)	(129.24)	(148.41)	(170.50)
Other, net	2.41	(0.04)	(10.47)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Income before income taxes and min. interest	732.74	304.37	662.40	195.54	173.65	190.22	182.26	744.60	861.38	969.95	1,096.06	1,222.18	1,295.96
Provision for income taxes:	--	--	--	--	--	--	--	--	--	--	--	--	--
Income Taxes	162.00	172.90	113.66	42.53	45.15	49.46	47.39	193.60	223.96	252.19	284.98	317.77	336.95
Minority interest	--	--	0.75	0.20	--	--	--	--	--	--	--	--	--
Net income	570.74	414.79	549.48	153.01	128.50	140.76	134.87	551.00	637.42	717.76	811.09	904.42	959.01
Shares used to compute earnings per share - Basic	375.03	371.79	358.76	338.70	338.70	338.70	338.70	338.70	338.70	338.70	338.70	338.70	338.70
Shares used to compute earnings per share - Diluted	392.85	383.47	370.96	349.20	349.20	349.20	349.20	349.20	349.20	349.20	349.20	349.20	349.20
Earnings per share -- Basic	1.52	1.12	1.53	0.45	0.38	0.42	0.40	1.64	1.88	2.12	2.39	2.67	2.83
Earnings per share -- Diluted	1.45	1.08	1.48	0.44	0.37	0.40	0.39	1.60	1.83	2.06	2.32	2.59	2.75
Dividends declared per share	0.20	0.32	0.56	0.16	0.18	0.18	0.18	0.70	0.75	0.80	0.84	0.88	0.92
<b>ASSUMPTIONS &amp; KEY RATIOS</b>	<b>10/30/2004</b>	<b>10/30/2005</b>	<b>10/30/2006</b>	<b>1Q07</b>	<b>2Q07</b>	<b>3Q07</b>	<b>4Q07</b>	<b>FY07(E)</b>	<b>FY08(E)</b>	<b>FY09(E)</b>	<b>FY10(E)</b>	<b>FY11(E)</b>	<b>FY12(E)</b>
R&D expenses as % of Sales	19.5%	20.8%	21.7%	21.9%	21.5%	21.5%	21.5%	21.5%	21.0%	21.0%	21.0%	21.0%	21.0%
SG&A as % of Sales	12.9%	14.2%	15.3%	15.9%	15.5%	15.5%	15.5%	15.5%	15.5%	15.0%	14.0%	13.0%	13.0%
Depreciation as % of Net PP&E		26.6%	26.2%					26.7%	26.7%	26.7%	26.7%	26.7%	26.7%
Interest Income as % of Cash & Investments		2.8%	5.0%					4.6%	4.5%	4.5%	4.5%	4.5%	4.5%
Income Taxes as % of NI	22.1%	56.8%	17.2%	21.7%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
<b>KEY RATIOS</b>													
Y-O-Y Revenue growth		-9.3%	7.7%					11.2%	11.7%	10.2%	8.5%	7.0%	5.0%
Y-O-Y Earnings growth		-27.3%	32.5%					0.3%	15.7%	12.6%	13.0%	11.5%	6.0%
<b>MARGINS</b>													
EBIT Margin %	26.6%	9.7%	21.4%	23.6%	21.7%	22.0%	21.7%	22.6%	23.7%	24.3%	25.3%	26.3%	
Gross Margin %	59.0%	57.9%	58.5%	60.3%	58.7%	59.0%	58.7%	59.6%	60.2%	60.3%	60.3%	60.3%	60.3%
Operating Margin %	27.9%	12.7%	25.3%	28.3%	25.1%	24.9%	24.3%	26.0%	26.9%	27.5%	28.7%	29.9%	30.2%
EBITDA Margin%	32.2%	16.2%	27.9%	29.6%	27.5%	27.0%	26.5%	28.1%	29.1%	29.6%	30.5%	31.5%	31.4%
Net Income Margin%	21.7%	17.4%	21.4%	22.1%	18.6%	18.4%	18.0%	19.2%	19.9%	20.4%	21.2%	22.1%	22.3%
ROA%		9.1%	13.8%					13.6%	14.5%	15.0%	15.4%	15.6%	15.0%
ROE%		11%	16.0%					16%	17%	18%	18%	18%	17%

Source: Company Documents, Student Estimates

**Figure C: Balance Sheet**

\$ In millions

<b>ANALOG DEVICES INC</b>								
<b>Consolidated Balance Sheet</b>								
<b>In Millions For Period Ended Oct 30</b>	<b>10/29/05</b>	<b>10/29/06</b>	<b>FY07(E)</b>	<b>FY08(E)</b>	<b>FY09(E)</b>	<b>FY10(E)</b>	<b>FY11(E)</b>	<b>FY12(E)</b>
Excess Cash and cash equivalents	495.90	224.51	417.05	581.19	806.59	1,125.77	1,538.44	2,019.00
Future Cash required for NWC	131.69	119.44	143.13	159.82	176.12	191.05	204.37	214.58
Short-term investments	2,078.35	1,784.39	1,555.27	1,555.27	1,555.27	1,555.27	1,555.27	1,555.27
Accounts receivable	320.52	329.39	372.13	415.52	457.90	496.74	531.35	557.92
Inventories	325.61	378.65	404.64	445.06	489.49	530.91	568.35	596.76
Deferred tax assets	86.43	91.05	77.40	77.40	77.40	77.40	77.40	77.40
Deferred compensation plan investments	234.38	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Prepaid expenses and other current assets	59.58	82.77	80.93	89.01	97.90	106.18	113.67	119.35
<b>Total current assets</b>	<b>3,732.46</b>	<b>3,011.30</b>	<b>3,051.66</b>	<b>3,324.38</b>	<b>3,661.77</b>	<b>4,084.44</b>	<b>4,589.95</b>	<b>5,141.40</b>
Net property, plant and equipment	599.91	562.63	583.96	639.26	697.42	748.94	792.94	824.00
Other Assets	--	--	--	--	--	--	--	--
Deferred compensation plan investments	42.94	30.58	31.98	31.98	31.98	31.98	31.98	31.98
Other investments	2.42	0.85	0.59	0.59	0.59	0.59	0.59	0.59
Goodwill	163.37	256.21	263.12	263.12	263.12	263.12	263.12	263.12
Intangible assets, net	4.20	42.81	39.74	39.74	39.74	39.74	39.74	39.74
Deferred tax assets	13.33	54.73	58.25	58.25	58.25	58.25	58.25	58.25
Other assets	24.58	27.74	23.89	25.73	28.63	31.96	35.22	38.21
<b>TOTAL ASSETS</b>	<b>4,583.21</b>	<b>3,986.85</b>	<b>4,053.19</b>	<b>4,383.05</b>	<b>4,781.49</b>	<b>5,259.02</b>	<b>5,811.79</b>	<b>6,397.29</b>
Current Liabilities	--	--	--	--	--	--	--	--
Accounts payable	128.32	124.57	138.74	152.59	167.82	182.03	194.86	204.60
Deferred income on shipments to distributors	121.80	149.54	157.44	175.80	193.73	210.16	224.80	236.04
Income taxes payable	172.28	60.96	67.74	67.74	67.74	67.74	67.74	67.74
Deferred compensation plan liability	234.38	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Accrued liabilities	162.15	154.77	170.73	184.98	203.46	223.77	242.70	259.82
<b>Total current liabilities</b>	<b>818.92</b>	<b>490.94</b>	<b>535.75</b>	<b>582.22</b>	<b>633.86</b>	<b>684.80</b>	<b>731.22</b>	<b>769.31</b>
Noncurrent Liabilities	--	--	--	--	--	--	--	--
Deferred income taxes	1.74	3.41	15.83	15.83	15.83	15.83	15.83	15.83
Deferred compensation plan liability	44.66	30.63	32.03	32.03	32.03	32.03	32.03	32.03
Other noncurrent liabilities	26.40	25.85	26.24	26.24	26.24	26.24	26.24	26.24
<b>Total noncurrent liabilities</b>	<b>72.79</b>	<b>59.90</b>	<b>74.10</b>	<b>74.10</b>	<b>74.10</b>	<b>74.10</b>	<b>74.10</b>	<b>74.10</b>
Common stock	61.14	57.00	55.62	55.62	55.62	55.62	55.62	55.62
Capital in excess of par value	380.21	--	--	--	--	--	--	--
Retained earnings	3,269.42	3,379.00	3,392.91	3,676.31	4,023.11	4,449.69	4,956.05	5,503.45
Accumulated other comprehensive loss	(19.26)	(0.21)	(5.19)	(5.19)	(5.19)	(5.19)	(5.19)	(5.19)
<b>Total shareholders' equity</b>	<b>3,691.50</b>	<b>3,435.79</b>	<b>3,443.34</b>	<b>3,726.74</b>	<b>4,073.54</b>	<b>4,500.12</b>	<b>5,006.48</b>	<b>5,553.88</b>
<b>TOTAL LIABILITIES &amp; EQUITY</b>	<b>4,583.21</b>	<b>3,986.85</b>	<b>4,053.19</b>	<b>4,383.05</b>	<b>4,781.49</b>	<b>5,259.02</b>	<b>5,811.79</b>	<b>6,397.29</b>
			0	0	0	0	0	0
<b>ASSUMPTIONS:</b>	<b>10/29/05</b>	<b>10/29/06</b>	<b>FY07(E)</b>	<b>FY08(E)</b>	<b>FY09(E)</b>	<b>FY10(E)</b>	<b>FY11(E)</b>	
Required Cash as % of Revenue	5.0%	5.0%	5%	5%	5%	5%	5%	5%
A/R as % of Revenue	13%	13%	13%	13%	13%	13%	13%	13%
Inventory as % of COS	32%	35%	35%	35%	35%	35%	35%	35%
Prepaid Expenses as % of COS	5.9%	7.8%	7%	7%	7%	7%	7%	7%
PROPERTY AND EQUIPMENT, NET as % of NR	25.1%	21.9%	20.4%	20%	19.8%	19.6%	19.4%	19.2%
OTHER ASSETS as % of Revenue	1.0%	1.1%	1%	1%	1%	1%	1%	1%
Accounts payable as % of COS	12.8%	11.7%	12%	12%	12%	12%	12%	12%
Deferred Income as % of Sales	5.1%	5.8%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Accrued liabilities as % of COS	16%	15%	16%	16%	16%	16%	16%	16%
<b>NET WORKING CAPITAL</b>	<b>425</b>	<b>481</b>	<b>534</b>	<b>596</b>	<b>656</b>	<b>709</b>	<b>755</b>	<b>788</b>

Source: Company Documents, Student Estimates

**Figure D: Revenue and Gross Margin Model**

		(all numbers in millions)														
Product Category		2002	2003	2004	2005	2006	1Q07	2Q07 E	3Q07 E	4Q07 E	2007(E)	2008(E)	2009(E)	2010(E)	2011(E)	
Analog	Converters	NOT BROKEN OUT IN 10K THIS WAY IN 2002	NOT BROKEN OUT IN 10K THIS WAY IN 2003	884.42	927.72	1023.50	263.65	270.79	308.57	303.30	1146	1272	1387	1470	1544	
	Y/Y Growth			4.9%	10.3%							12%	11%	9%	6%	5%
Analog	Amplifiers			467.22	445.73	532.05	137.73	142.64	167.71	163.78	612	698	767	836	903	
	Y/Y Growth			-4.6%	19.4%							15%	14%	10%	9%	8%
Analog	Other Analog			285.59	242.81	301.63	93.78	98.29	97.54	78.39	368	442	525	615	689	
	Y/Y Growth			-15.0%	24.2%							22%	20%	19%	17%	12%
Analog	Power Mgt			264.21	214.16	219.65	51.19	56.80	57.77	69.27	235	259	284	307	322	
	Y/Y Growth			-18.9%	2.6%							7%	10%	10%	8%	5%
Digital	GP DSP			175.30	186.66	205.48	55.70	53.76	57.99	57.56	225	248	272	297	320	
	Y/Y Growth			6.5%	10.1%							10%	10%	10%	9%	8%
Digital	DSP ASIC & Network Proc.*	56.12	54.90	14.50	0.00	0.00	0.00	0.00	0	0	0	0	0			
	Y/Y Growth	-2.2%	-73.6%							-100%	0	0	0	0		
Digital	Wireless Chipsets	432.64	266.59	238.70	46.97	59.67	64.67	67.38	239	241	248	258	271			
	Y/Y Growth	-38.4%	-10.5%							0%	1%	3%	4%	5%		
Digital	Other DSP	68.31	50.25	37.66	7.60	9.42	10.42	10.23	38	38	38	38	38			
	Y/Y Growth	-26.4%	-25.0%							0%	0%	0%	0%	0%		
	Total	1,708	2,047	2,633.80	2,388.81	2,573.18	656.6	691.4	764.7	749.9	2863	3196	3522	3821	4087	
	Y/Y Growth	-25.0%	19.9%	28.6%	-9.3%	7.7%					11.2%	11.7%	10.2%	8.5%	7.0%	
Product Category as % of NR		2002	2003	2004	2005	2006	1Q07	2Q07	3Q07	4Q07	2007(E)	2008(E)	2009(E)	2010(E)	2011(E)	
Analog	Converters	80%	60%	34%	39%	40%	40%	39%	40%	40%	40%	40%	39%	38%	38%	
Analog	Amplifiers			18%	19%	21%	21%	21%	22%	22%	21%	22%	22%	22%	22%	22%
Analog	Other Analog			11%	10%	12%	14%	14%	13%	10%	13%	14%	15%	16%	17%	
Analog	Power Mgt		18%	10%	9%	9%	8%	8%	8%	9%	8%	8%	8%	8%	8%	
Digital	GP DSP		7%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	
Digital	DSP ASIC & Network Proc.		20%	22%	2%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
Digital	Wireless Chipsets		16%	11%	9%	7%	9%	8%	9%	8%	8%	7%	7%	7%		
Digital	Other DSP		3%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
	Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
GM% by Prod. Category			2004	2005	2006	2007(E)	2008(E)	2009(E)	2010(E)	2011(E)						
Analog	Converters	67.0%	65.0%	65.0%	65.0%	65.0%	65.0%	66.0%	66.5%							
Analog	Amplifiers	67.0%	65.0%	65.0%	64.0%	64.0%	64.0%	64.0%	64.5%							
Analog	Other Analog	65.0%	62.0%	62.0%	62.0%	62.0%	63.0%	63.0%	64.5%							
Analog	Power Mgt	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	52.0%	52.5%							
Digital	GP DSP	45.0%	42.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%							
Digital	DSP ASIC & Network Proc.	45.0%	42.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%							
Digital	Wireless Chipsets	45.0%	42.0%	40.0%	40.0%	40.0%	40.0%	40.0%	39.0%							
Digital	Other DSP	45.0%	42.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%							
	Total	67.0%	65.0%	65.0%	65.0%	65.0%	65.0%	66.0%	66.5%							
GM by Prod. Category		2004GM	2005GM	2006GM	2007(E)	2008(E)	2009(E)	2010(E)	2011(E)							
Analog	Converters	592.56	603.02	665.27	171.37	176.02	200.57	197.15	756.57							
Analog	Amplifiers	313.04	289.73	345.83	88.15	91.29	107.34	104.82	391.59							
Analog	Other Analog	185.63	150.54	187.01	58.14	60.94	61.45	49.38	235.52							
Analog	Power Mgt	132.10	107.08	109.83	25.59	28.40	28.89	34.63	122.21							
Digital	GP DSP	78.89	78.40	82.19	22.28	21.50	23.20	23.02	90.00							
Digital	DSP ASIC & Network Proc.	25.25	23.06	5.80	0.00	0.00	0.00	0.00	0.00							
Digital	Wireless Chipsets	194.69	111.97	95.48	18.79	23.87	25.87	26.95	95.48							
Digital	Other DSP	30.74	21.10	15.06	3.04	3.77	4.17	4.09	15.06							
	"Fudge factor"	0.90	-2.05	-0.34	0.00	0.00	0.00	0.00	-							
	Total	802.98	923	1553.80	387.36	405.78	451.47	440.05	1706.43							
	Total GM%	47.0%	45.1%	59.0%	57.9%	58.5%	59.0%	58.7%	59.0%							

Source: Company Documents, Student Estimates

**Figure E: Cash Flow and Discounted Cash Flow**

\$ In millions

Analog Devices, Inc Discounted Cash Flow										
all numbers in millions										
		FY05(A)	2006	2007	2008	2009	2010	2011	2012	
=	EBIT	232.7	551.8	647.3	758.0	855.7	966.8	1,073.8	1,127.5	
	Depreciation	153.2	166.9	155.9	170.7	186.2	200.0	211.7	220.0	
	EBITDA	385.8	718.7	803.2	928.7	1,041.9	1,166.8	1,285.5	1,347.5	
-	Cash taxes	132.2	94.7	168.3	197.1	222.5	251.4	279.2	293.1	
	EBIAT	100.5	457.1	479.0	561.0	633.2	715.4	794.6	834.3	
+	Depreciation	153.2	166.9	155.9	170.7	186.2	200.0	211.7	220.0	
-	change in NWC		56.2	52.6	62.1	60.4	52.5	46.4	32.8	
-	Capex (gross)		129.6	177.3	226.0	244.4	251.5	255.7	251.1	
	Free CF to enterprise		438.2	405.1	443.5	514.7	611.4	704.2	770.5	
										growth model, g= 5% TV1= 18,534
										EV/EBITDA = 9.8X TV2= 13,205
	NPV (perp growth)			370	371	394	427	450	11243	
	NPV (CompCo EBITDA)			370	371	394	427	450	8129	
	EV (perp growth) =	\$13,255.21								EV (TV using 9.8x EBITDA) = \$10,141.18
	Debt =	\$0.00								Debt = \$0.00
	Excess Cash & Investments=	\$2,008.89								Excess Cash & Investments= \$2,008.89
	Fair Market Cap =	\$15,264.11								Fair Market Cap = \$12,150.07
	# shares out (diluted) =	333.72								# shares out (diluted) = 333.72
	Fair Stock Price =	45.74								Fair Stock Price = 36.41
	<b>AVERAGE OF THE 2 METHODS=</b>			<b>41.07</b>	<== Implied Today's Fair Value					
	<b>Today's Market Price =</b>			<b>35.33</b>	<== As of 3/16/07					
	<b>1-Year Price Target =</b>			<b>44.22</b>						
	<b>Projected 1-year return =</b>			<b>25.2%</b>	<== Buy Rating					
	Beta(levered)	1.39	(Bloomberg)							
	Debt/Asset Ratio	0								
	Effective Tax rate=	26%	(CSFB Estimate)							Base Case Value = 41.14
	Rf=	4.50%	(10 year T-bond)							10% revenue drop in 2008 37.98
	Risk Premium=	3.50%								Chipsets exit in 2007, gone in 2008 41.21 (little value added by chipsets!)
	Ke=	9.4%								GM% declines to 55% average 33.52
	Kd=	0.0%	Not applicable							Lever up' to 30% Deb: 42.16
	WACC =	9.4%								
	Terminal Growth =	5%								

Source: Student Estimates

**Figure F: Comparable Company Analysis & Price Target**

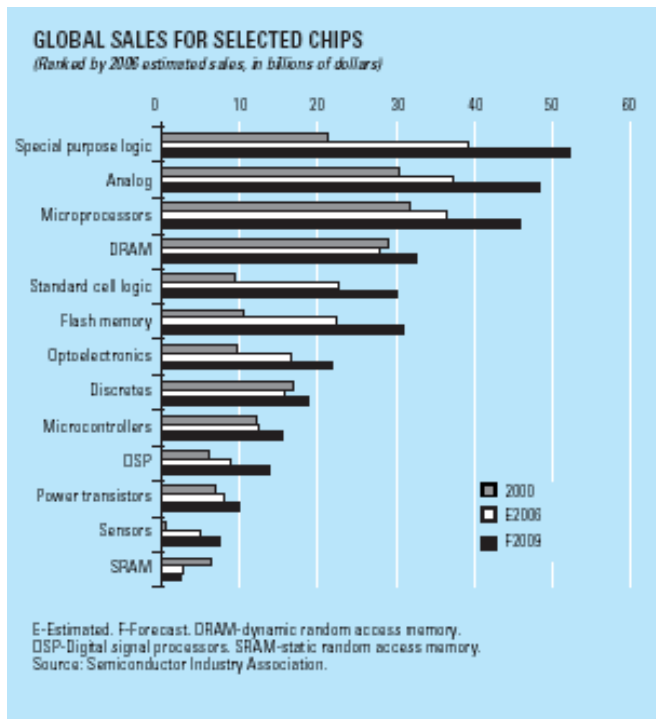
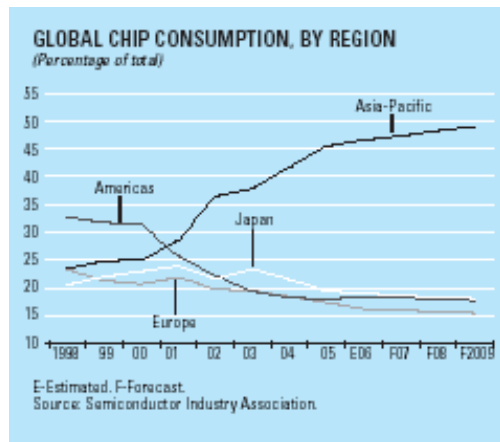
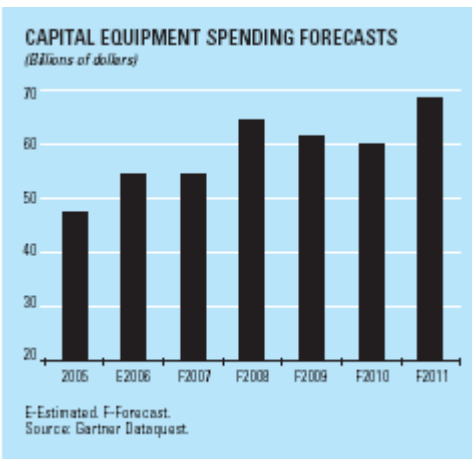
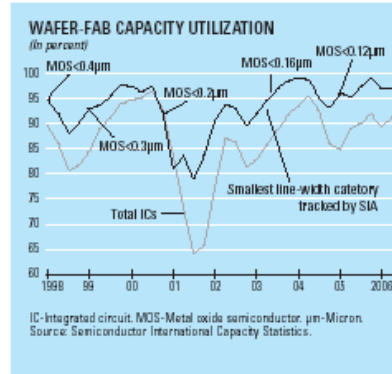
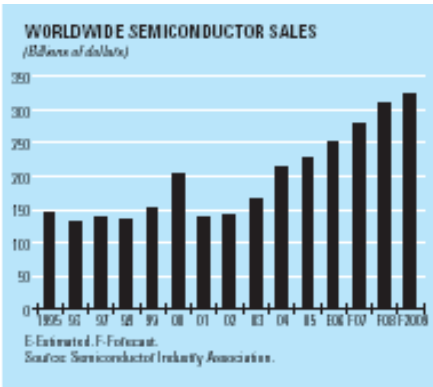
\$ In millions

Ticker	Analog ADI	Intersil ISIL	Linear Tech LLTC	Maxim MXIM	National NSM	Microchip MCHP	STMicro STM	Texas Inst TXN		
Stock Price (Mar 16)	\$35.33	\$25.48	\$33.61	\$31.90	\$24.87	\$36.44	\$18.90	\$31.28		
Shares Outst (mm,basic)	334	138	299	321	319	216	897	1444		
									<b>Median</b>	<b>Impl value</b>
TTM P/E	22.0	23.8	23.3	22.9	18.7	26.2	23.0	11.2	23.0	\$36.95
P/FE	22.1	20.4	24.5	26.8	23.2	26.6	22.2	19.9	23.2	\$37.19
EV/S	3.7	3.9	7.3	4.6	3.3	6.9	1.7	2.9	3.9	\$36.84
EV/EBITDA	11.3	12.5	12.0	9.6	8.1	14.7	6.5	8.4	9.6	\$30.78
EV/EBIT	14.0	14.5	13.0	10.5	9.8	19.2	21.8	11.2	13.0	\$33.24
P/BV	3.6	1.5	4.8	3.7	4.5	4.2	1.7	4.0	4.0	\$38.84
P/EV	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.1	1.1	\$32.60
Market Cap/FCF	43.9	30.7	28.2	28.8	22.7	27.7	46.5	23.0	28.2	\$22.66
									<b>Price</b>	<b>\$33.87</b>

	Price	Weight	
DCF	\$ 41.07	50.00%	
Compco	\$ 33.87	50.00%	
<b>Price Target</b>		<b>\$ 37.47</b>	
<b>1 Year Price Target</b>		\$ 40.98	
<b>Today's Price</b>		\$ 35.33	3/16/2007
<b>Expected 1-year return</b>		15.99%	
<b>Rating</b>		<b>BUY</b>	

Source: Company Documents, Student Estimates, Capital IQ

Figure G: Industry Trends





**Figure H: Category Description of Product Line and Respective 3-YR CAGR and % of Total Sales**

By Product Category		3 Year CAGR	% Total Sales (Q107)	Description
Analog Products	Converters	16%	40%	<ul style="list-style-type: none"> <li>- ADI is the market leader in this segment with more than 40% of the market share.</li> <li>- ADI's products are high performance ICs which support a minimum of 10-bits of accuracy and a minimum of 50 megahertz of speed.</li> </ul>
	Amplifiers	13%	21%	<ul style="list-style-type: none"> <li>- In the amplifier market, ADI is a <b>close second</b> to TXN with close to 15% market share.</li> <li>- ADI's amplifiers commands 5X the average selling price due to its high performance characteristics and brand recognition.</li> </ul>
	Power Management & References	-3%	8%	<ul style="list-style-type: none"> <li>- ADI's power management portfolio includes voltage regulators and thermal monitoring ICs, phase locked loops and high-speed clock ICs.</li> <li>- Though ADI's power management products are <b>rated #2 by brand preference, it is in the 11th position</b> with respect to sales in the Power management IC Suppliers market.</li> <li>- ADI has emphasized its increased focus in this sector to improve its market share thorough increased investment and leadership changes.</li> </ul>
	Other Analog	16%	14%	<ul style="list-style-type: none"> <li>- ADI's iMEMS product portfolio includes accelerometers used by automotive manufacturers in airbag applications.</li> <li>- With the success of Wii, the demand for ADI's MEMS products has increased in the consumer and industrial sectors.</li> </ul>
DSP Products	General Purpose DSP	9%	9%	<ul style="list-style-type: none"> <li>- ADI's general purpose segment has grown steadily in the past three years.</li> <li>- The company's products in this segment can be programmed by customers through ADI and third party tools</li> </ul>
	DSP-based DSL ASIC and Network products*	-40%	0%	<ul style="list-style-type: none"> <li>- This segment was <b>disposed in the second quarter</b> of fiscal 2006</li> </ul>
	Wireless Handset Chipsets	-5%	7%	<ul style="list-style-type: none"> <li>- The Wireless Handset chip business saw significant growth in 2002-2003 and has <b>significantly decreased</b> in the last two years.</li> </ul>
	Other DSP	-21%	1%	<ul style="list-style-type: none"> <li>- The Company's application-specific DSP products are preprogrammed to execute software for applications, such as wireless telecommunications or image processing.</li> <li>- ADI acknowledges that generating consistent growth in this sector has been a <b>challenge</b>.</li> </ul>

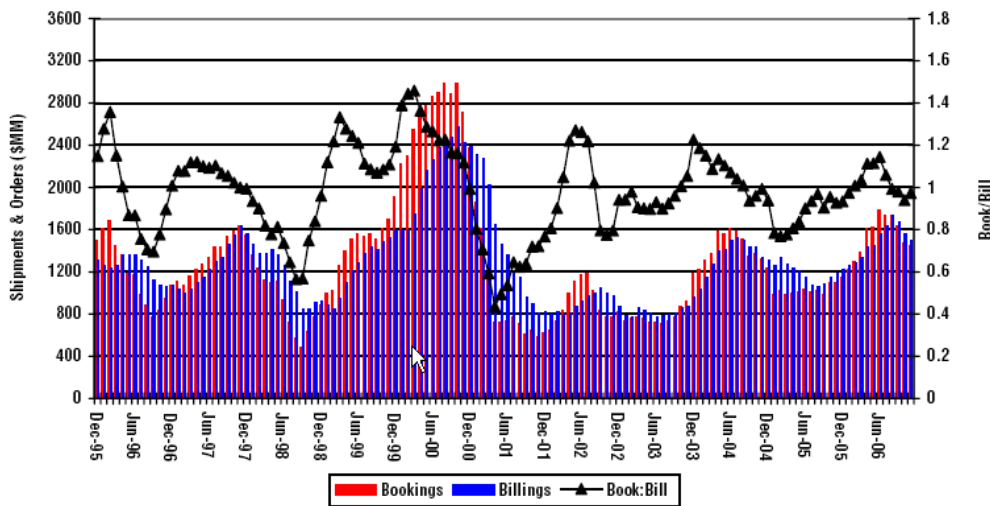
Source: 10Q, Capital IQ

**Figure I: Category Description of End-Market and % of Total Sales**

By End Markets	% Total Sales (Q107)	Description
<b>Industrial</b>	<b>44%</b>	The industry market applications can be broadly classified as: - <b>Industrial Process Automation:</b> Applications such as factory automation systems, automatic process control systems, robotics, environmental control systems and automatic test equipment. - <b>Instrumentation:</b> Engineering, medical and scientific instruments - <b>Defense/Aerospace:</b> Space and broadcast satellite applications, navigation systems, flight simulators, radar systems and security devices. - <b>Automotive:</b> Crash sensor in airbag systems, roll-over sensing, global positioning satellite, or GPS, automotive navigation systems, anti-lock brakes etc. Sales to automotive customers grew at 14% 3-year CAGR and comprised of 8% of sales in 2006.
<b>Computer</b>	<b>10%</b>	- In this segment, ADI's products are used to enable image and sound-enabled applications, and improve power and thermal management capability in PCs. - <b>Lite Computing</b> based on an IP enabled computer from Lite Appliance and the much anticipated launch of <b>Microsoft Vista</b> which includes ADI audio codecs are some of the prime drivers for this segment in 2007.
<b>Communications</b>	<b>26%</b>	- ADI's products are used in the full spectrum of signal processing for audio, data, image and video communication. - In wireless and broadband communication applications, ADI's products are incorporated into cellular handsets, cellular base station equipment, modems, pagers, PBX switches, routers and remote access servers
<b>Consumer</b>	<b>20%</b>	- Applications include mobile multimedia devices, digital camcorders and cameras, home theater systems, advanced flat-screen and plasma digital televisions, video projectors and high-definition DVD recorders/players. - Sales due to consumer electronics have grown at a rate of 19% over the past three years and have been one of the <b>hottest areas of growth</b> in ADI.

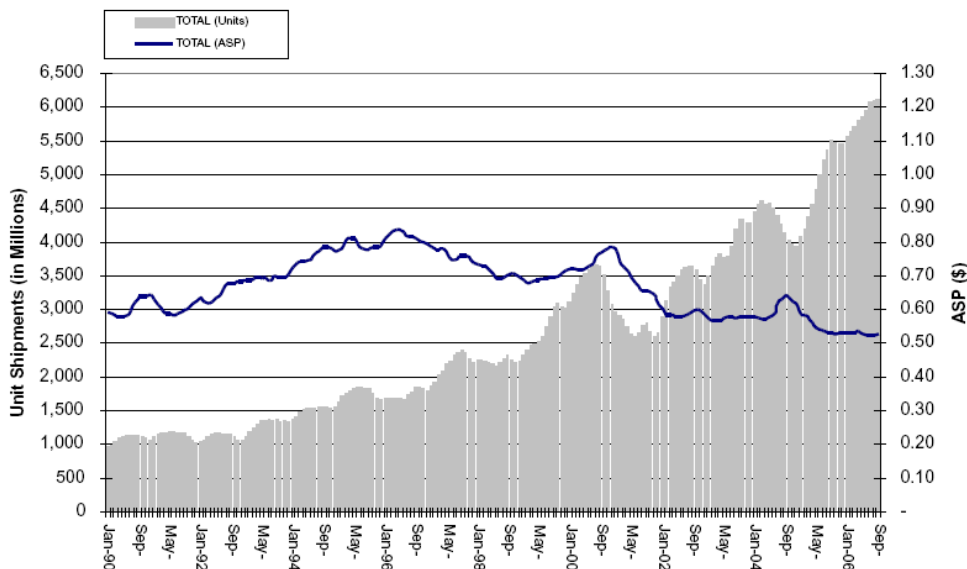
Source: 10Q, Capital IQ

**Figure J: North American Semiconductor Equipment Book/Bill (3-month rolling average)**



Source: Semiconductor Equipment and Materials Institute

**Figure K: Rolling 3-Month Analog Semiconductor Unit Shipment and ASP Trends, Jan 1990 – Nov 2006**



Source: World Semiconductor Trade Statistics (WSTS)

**Figure L: Financial Ratios**

<u>Y/Y Revenue Growth</u>													
<u>(Over Prior Year)</u>	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	LTM	AVG
ADI	26.8%	4.2%	-1.0%	17.9%	77.7%	-11.7%	-25.0%	19.9%	28.6%	-9.3%	7.7%	8.8%	12.3%
TXN	-12.9%	0.3%	-11.0%	10.0%	21.7%	-30.9%	2.2%	17.3%	27.9%	6.5%	6.4%		3.4%
MCHP	37.5%	16.9%	18.7%	16.1%	20.0%	29.4%	-20.2%	14.0%	7.3%	21.1%	9.6%	15.7%	15.5%
LLTC	42.5%	0.4%	27.8%	4.5%	39.3%	37.8%	-47.3%	18.4%	33.1%	30.0%	4.1%	6.0%	17.3%
MXIM	68.1%	2.9%	29.2%	79.0%	37.2%	14.6%	-35.0%	12.5%	24.8%	16.2%	11.2%	16.6%	23.7%
ISIL			5.8%	-35.7%		-18.2%	5.3%	21.0%	5.5%	12.0%	23.4%		2.4%
NSM	19.1%	-5.3%	-5.5%	-22.9%	9.4%	-1.3%	-29.2%	11.9%	18.6%	-3.5%	12.8%	10.7%	0.4%
Industry	25.9%	2.6%	9.1%	9.8%	29.3%	2.8%	-21.3%	16.4%	20.8%	10.4%	10.7%	8.3%	10.6%

<u>Return On</u>													
<u>Assets %</u>	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	LTM	AVG
ADI	11.3%	8.9%	5.2%	7.6%	14.5%	6.2%	2.3%	5.3%	10.0%	7.4%	9.8%	10.7%	8.0%
TXN	-0.2%	4.1%	2.6%	8.7%	9.4%	-0.8%	1.3%	4.6%	8.8%	11.9%	15.9%		6.0%
MCHP	14.8%	12.5%	12.0%	12.3%	13.2%	12.2%	6.3%	8.1%	8.4%	10.2%	9.8%	10.8%	10.9%
LLTC	26.6%	19.5%	19.7%	16.6%	18.3%	19.4%	7.0%	9.1%	13.2%	17.4%	16.5%	16.8%	16.7%
MXIM	34.5%	25.5%	24.0%	25.8%	21.9%	18.2%	10.1%	13.1%	15.5%	18.0%	16.6%	16.2%	20.3%
NSM	5.8%	3.4%	1.0%	-9.4%	8.1%	7.3%	-4.2%	0.4%	10.0%	11.2%	16.9%	19.4%	4.6%

<u>Return On</u>													
<u>Capital %</u>	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	LTM	AVG
ADI	14.4%	10.9%	6.5%	9.6%	18.2%	7.6%	2.7%	6.4%	12.5%	9.2%	11.7%	12.6%	10.0%
TXN	-0.3%	6.2%	3.7%	12.3%	12.4%	-1.0%	1.6%	5.6%	10.7%	14.3%	19.3%		7.7%
MCHP	20.3%	16.7%	15.8%	16.2%	17.0%	15.3%	7.6%	9.7%	10.3%	12.3%	11.6%	12.8%	13.9%
LLTC	31.8%	22.9%	23.0%	19.4%	21.0%	22.0%	7.9%	10.2%	15.1%	20.0%	18.8%	18.9%	19.3%
MXIM	46.1%	31.4%	29.1%	30.6%	26.2%	21.6%	11.6%	15.1%	18.3%	21.3%	19.4%	19.1%	24.6%
NSM	8.1%	4.6%	1.3%	-13.1%	11.6%	9.8%	-5.4%	0.5%	13.2%	14.2%	21.1%	24.8%	6.0%

<u>Return On</u>													
<u>Equity %</u>	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	LTM	AVG
ADI	22.6%	18.3%	10.8%	14.3%	31.0%	13.8%	3.7%	9.6%	16.1%	11.1%	15.4%	16.7%	15.2%
TXN	-1.1%	6.8%	7.1%	17.8%	27.9%	-1.6%	-3.0%	10.6%	14.9%	18.6%	22.6%		11.0%
MCHP	22.9%	19.1%	18.8%	12.8%	22.5%	17.8%	9.4%	8.8%	11.0%	15.2%	15.1%	17.2%	15.8%
LLTC	35.8%	26.1%	26.9%	23.4%	25.8%	27.5%	11.1%	13.2%	18.1%	22.7%	20.9%	21.1%	22.9%
MXIM	48.9%	34.6%	32.5%	35.1%	28.7%	17.5%	13.5%	16.2%	20.1%	23.0%	17.5%	16.9%	26.1%
NSM	13.5%	0.1%	-5.3%	-73.2%	49.3%	14.4%	-6.9%	-1.9%	16.8%	22.2%	22.6%	25.4%	4.7%

<u>R&amp;D-To-Sales Over</u>													
<u>Time</u>	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	LTM	AVG
ADI	14.9%	15.8%	17.8%	17.4%	15.1%	20.4%	24.8%	22.1%	19.5%	20.8%	20.9%	20.8%	19.1%
TXN	10.0%	11.0%	14.0%	13.3%	13.8%	19.5%	19.3%	17.8%	15.7%	15.1%	15.4%		15.0%
MCHP	9.6%	9.6%	9.7%	10.1%	9.5%	11.0%	14.3%	13.5%	12.2%	11.0%	10.2%	10.7%	11.0%
LLTC	8.2%	9.3%	9.5%	10.8%	11.1%	10.5%	15.6%	15.1%	13.0%	12.5%	14.7%	15.6%	11.9%
MXIM	11.3%	11.8%	12.9%	14.5%	15.8%	17.8%	26.9%	23.6%	21.3%	19.6%	25.9%	25.5%	18.3%
NSM	13.4%	15.1%	19.0%	24.1%	18.0%	20.6%	29.5%	26.3%	18.0%	17.4%	15.1%	15.9%	19.7%

Source: Student Estimates, Capital IQ

**Figure M: Future Proofing with ADI’s Blackfin (Design News, January 2007)**

From the pages of Design News

Processor Family Aims to 'Future-Proof' Autos

Charles J. Murray, Senior Technical Editor – 1/8/2007

A new processor family could help automakers and tier-one suppliers deal with rapidly changing electronic design standards in the dashboard by integrating a wide array of peripherals and multimedia support elements.

Analog Devices' new Blackfin ADSP-BF54x family incorporates CAN (Control Area Network) and MOST (Media-Oriented System Transport) databus peripherals and supports an alphabet soup of electronic device standards for cameras, MP3 players and video systems.

"We're focusing on the issues that automotive manufacturers are having right now, and we're trying to help them solve their problems," says Dan Callen, senior product manager for Analog Devices Inc.

Specifically, the new processor family is targeting the well-known cycle time differential that has befuddled automakers during the past five years. Automakers are now increasingly moving away from the permanent embedding of electronic consumer products in their vehicles, mainly because those products are often obsolete by the time vehicles reach the streets. Most automakers and tier-one suppliers are now creating electrical architectures that enable consumers to bring their handheld devices — hands-free phones, iPods, MP3 players, cameras, navigation devices and video players — into their vehicles, as a means of so-called "future-proofing."

Analog Devices' new Blackfin family could serve as an adjunct to that effort by incorporating many of the necessary peripherals needed to support those devices. The ADSP-BF54x, for example, includes support for USB On The Go, a standard that allows USB devices to talk to one another, and MXVR (Media Transfer), an interface that integrates automotive telematics systems and infotainment systems through a MOST 2 network.

Callen says up until now, vehicle manufacturers had to use multiple chips — ranging from specialized audio and video processors to dedicated devices for cell phones and navigation systems — to accomplish all that. With the new processor family, he says, that will change.

"The piece that engineers didn't have before was a single processor that could do multimedia processing while supporting an operating system and doing multimode communications," Callen says. "Now, they can do it with one device."

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**Figure N: LBO Analysis**

ADI LBO Valuation				DSP Divestiture Valuation	
Current price	35.4			2006 Sales	496
Shares Outstanding	333.72			Premium	1.7
Market Cap	11814			Sale price	843
Premium assumed	20%				
Offer price	\$14,176	at	\$42.48		
Less: Cash	\$1,956				
Less: Investment Banker costs	200				
Less: DSP Divestiture	843	at	1.7		
<b>Deal Price</b>	<b>\$11,177</b>				

Financing terms		
Private Equity	30%	\$3,353
Debt	70%	\$7,824

Leverage Scenario	FY07(E)
EBIT	635
D&A	143
EBITDA	778

The private equity consortium must raise 10X EBITDA ! (Typically, raising 7X EBITDA is the norm)

Finance Sources	Leverage	Debt	Interest	Debt Burden
Bank Term Loans	8	6219	6.00%	373
Subordinated Debt	2	1605	9.00%	144
<b>Total Debt</b>		<b>7824</b>		<b>518</b>

Assuming exit year 2012  
ADI Sponsor return

Year	2007	2008	2009	2010	2011	2012	Exit Multiple
Exit Enterprise Value						12249	9
Initial Investment	(3353)						
Less Debt						(7824)	IRR
<b>Return on Investment</b>	(3353)	0	0	0	0	4425	<b>6%</b>

Entry Premium on Current Share Price	Exit Multiple				
	8.7	9.4	10.0	10.6	11.3
18%	5.17%	9.13%	12.59%	15.67%	18.45%
19%	4.27%	8.30%	11.81%	14.92%	17.73%
21%	3.37%	7.47%	11.03%	14.18%	17.02%
22%	2.47%	6.64%	10.26%	13.45%	16.32%
24%	1.55%	5.81%	9.48%	12.71%	15.61%
25%	0.64%	4.98%	8.71%	11.98%	14.91%

Source: Student Estimates, Capital IQ

**Figure O: ADI vs. Semiconductor index (SOXX)**



Source: Bigcharts.com

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