

Understanding the S&P 500 – this index offers a lot of international exposure

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**Indrani De, CFA, PRM
Director of Quantitative Research
New Amsterdam Partners LLC**

Main Take-Away Points

- **Strong economic & business reasons why S&P 500 has a strong correlation with global indices. It's NOT just about financial market integration.**
- S&P 500 constituents :
 1. A large & increasing fraction of revenue from international markets.
 2. International operations are a major driver of earnings growth.
 3. Bigger the company (greater the index wt) more the growth driven by overseas
- In 2010, ~ 40% of the market weighted sales of the S&P 500 were international. During 2000 - 2010, ~ 40% of the S&P 500's earnings growth came from international sales, and in some years it was ~ 60%. **International diversification**
- Foreign sales following trends in global GDP growth. Benefits from fast growth in the emerging markets of Latin America & Asia. **Geographic diversification.**
- U.S. index offers **sector diversification** close to that of the global index
- **Large & growing international business of constituents, geographic distribution of the foreign sales following trends in global GDP growth → economic drivers for the high degree of co-movement between S&P 500 & global indices' returns**
- Domestic investors achieve substantial diversification/global exposure via SP500
- For active managers understanding the extent of international exposure is an important part of knowing the index characteristics.

Data and Econometric Methodology

| | |
|---------------|---|
| U.S. index | S&P 500 (SPX) |
| World-ex-USA | MSCI World ex USA Investable Market Index (MXWDU) |
| Global Market | MSCI All World Investable Market Index (MXWD) |

Index prices, monthly frequency, 12/31/2000 through 6/30/2011

Monthly Arithmetic Return $t = [(P_t / P_{t-1}) - 1] * 100$

Strong Co-movement of the three indices

International business exposure proxied by foreign sales, annual frequency, 2000-2010

S&P 500 constituents on 12/31/YYYY

International sales for FY ending $MM_i / YYYY$, MM_i being month of fiscal year-end.

[Ex-USA/ Total] Sales of the S&P 500 constituents = S&P 500's International Sales.

(1) International Sales as % of Total Sales over time

(2) Contribution of international operations to the sales *growth* of the S&P 500

Large and growing international business of S&P 500 is an economic driver for the high degree of co-movement between US index and international & global indices

Stock Market Capitalization (SMC) and GDP data, current U.S.\$, annual frequency, 2000–2010, World Bank data. Time-series data for three ratios;

(1) [ex-USA/ World] GDP (2) [ex-USA/ World] SMC (3) [ex-USA/ Total] S&P 500 Sales

International business operations of S&P 500 followed world GDP and SMC trends

Annualized growth rate of (1) S&P 500 international sales (2) GDP (3) SMC among four geographic blocs - Americas (excluding USA), Europe (including Russia), Asia (including Australia), Other (mainly Africa).

Decomposed the *U.S. \$ value* of the index domestic and international sales into *units* of domestic and international sales by excluding the inflation and exchange rate effect.

CPI inflation calculator, Bureau of Labor Statistics.

Annual average exchange rate using daily (trade basket weighted) exchange rate for U.S. \$, Federal Reserve.

Foreign Unit Sales_i = (\$ Value of Foreign Sales)_i / (Avg Trade Weighted U.S. \$)_i

U.S. Unit Sales_i = (\$ Value of U.S. sales)_i / (Constant Year 2000 Value of U.S. \$)_i

i = year (2000 – 2010)

% Share of Foreign Sales in Units_i = [Foreign Unit Sales_i] / [Foreign Unit Sales_i + U.S. Unit Sales_i]

S&P 500 companies incorporated GDP growth rates, exchange rate movements and inflation (in deciding unit international sales). Investing in/ benchmarking to S&P 500 was akin to making making international equity investments incorporating these important considerations.

Of the major geographic blocs, sector weights of U.S index most similar to global index.
Sector diversification through US index similar to investing in global index.

Chart 1: Index Levels - MXWD, MXWDU & SPX

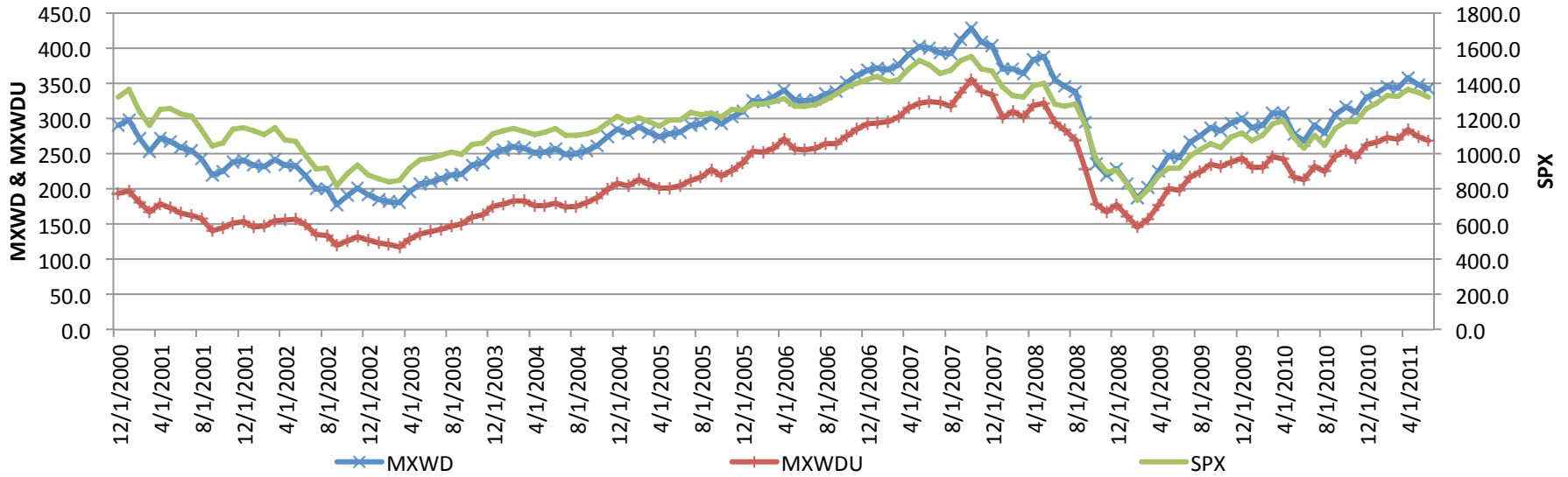
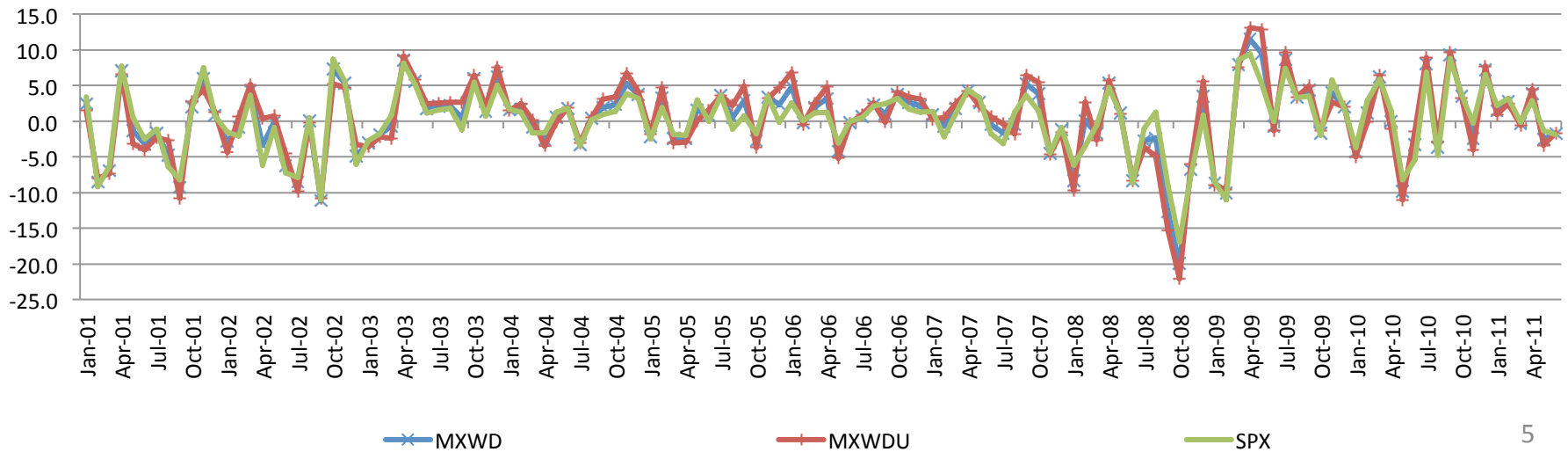
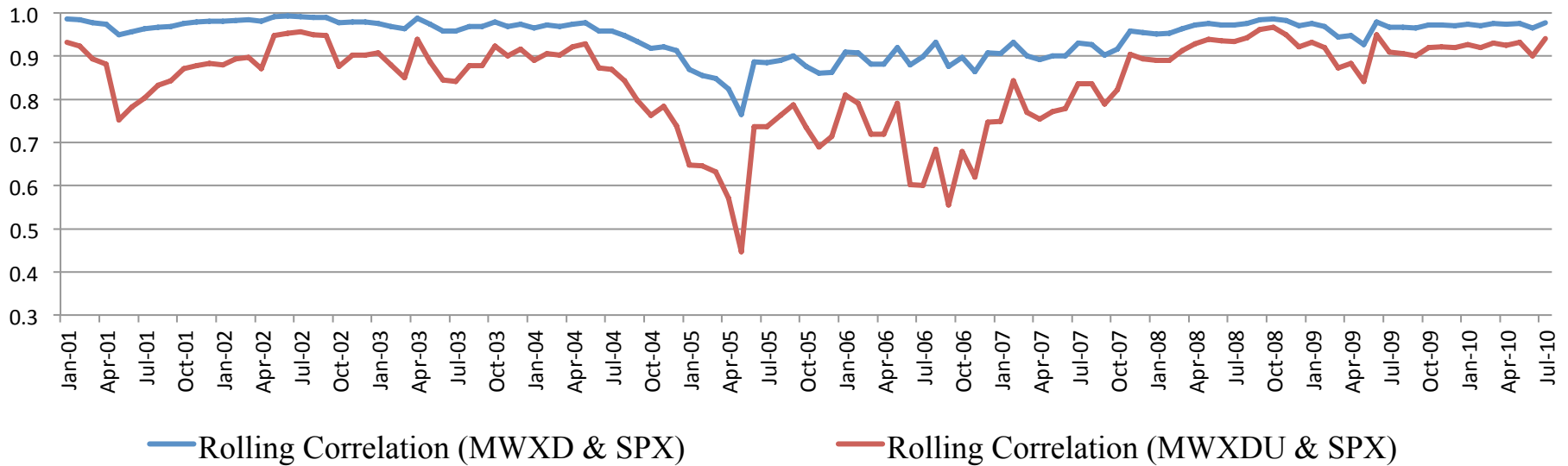


Chart 2: Monthly Returns - MXWD, MXWDU & SPX



Rolling Correlation in Monthly Returns (Subsequent Twelve Months)



Obviously S&P 500 will correlate more with (World=MWXD) than with (ex-USA=MWXDU).

Chart 1 (Index Levels) – indices co-moved closely, and much more closely post July 2007

The correlation between returns of the U.S. and (ex-USA) indices increased from 86% to 92% in the later part of the decade (pre & post July 2007)

The rolling twelve-month correlation between the S&P 500 and the ex-USA index in the last decade has ranged from 45% to 97% with the average 84%.

Economic reasons for the high correlation between S&P 500 & World indices

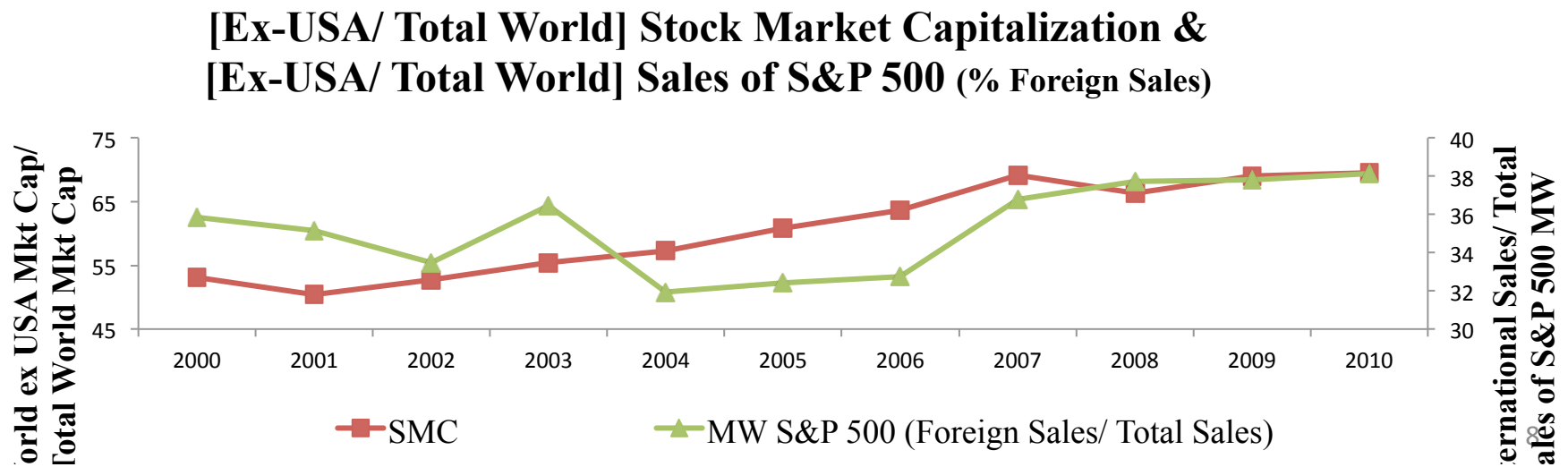
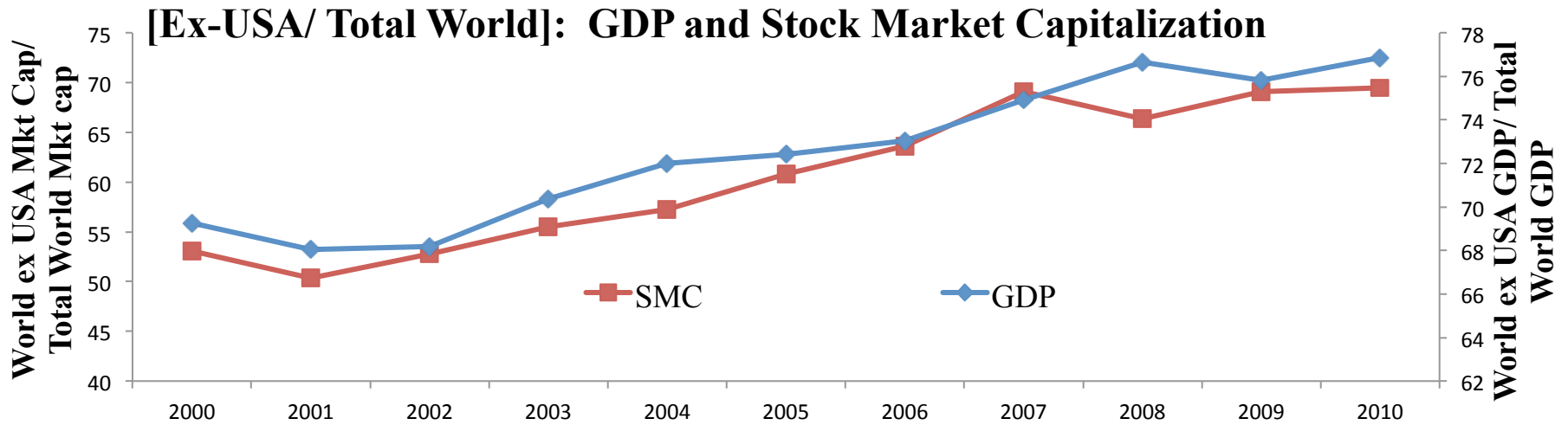
International (%) Sales of the S&P 500: 2000 - 2010

| S&P 500 | Equally Weighted (EW) | Market Capitalization Weighted (MW) | $\frac{\sum(\text{ForeignSales})_{500}}{\sum(\text{Sales})_{500}}$ | Average of 3 Methods |
|------------|-----------------------|-------------------------------------|--|----------------------|
| 12/31/2000 | 25.4 | 35.9 | 28.1 | 29.8 |
| 12/31/2001 | 26.6 | 35.1 | 28.1 | 29.9 |
| 12/31/2002 | 26.7 | 33.5 | 27.5 | 29.2 |
| 12/31/2003 | 28.4 | 36.5 | 29.7 | 31.5 |
| 12/31/2004 | 26.0 | 31.9 | 28.6 | 28.8 |
| 12/31/2005 | 26.2 | 32.4 | 28.6 | 29.1 |
| 12/31/2006 | 26.2 | 32.7 | 29.0 | 29.3 |
| 12/31/2007 | 27.9 | 36.8 | 30.8 | 31.8 |
| 12/31/2008 | 29.0 | 37.7 | 32.3 | 33.0 |
| 12/31/2009 | 28.6 | 37.8 | 30.0 | 32.2 |
| 12/31/2010 | 29.1 | 38.2 | 30.2 | 32.5 |

- Rising & considerable international exposure, almost 40% in 2010.
- MW > EW implying larger companies have much more international exposure

[Rest of the World] gaining share of World GDP & Stock Market capitalization (SMC)

International exposure of the S&P 500 followed macro trends in GDP & SMC



International Operations:

Major Driver of Earnings *Growth*

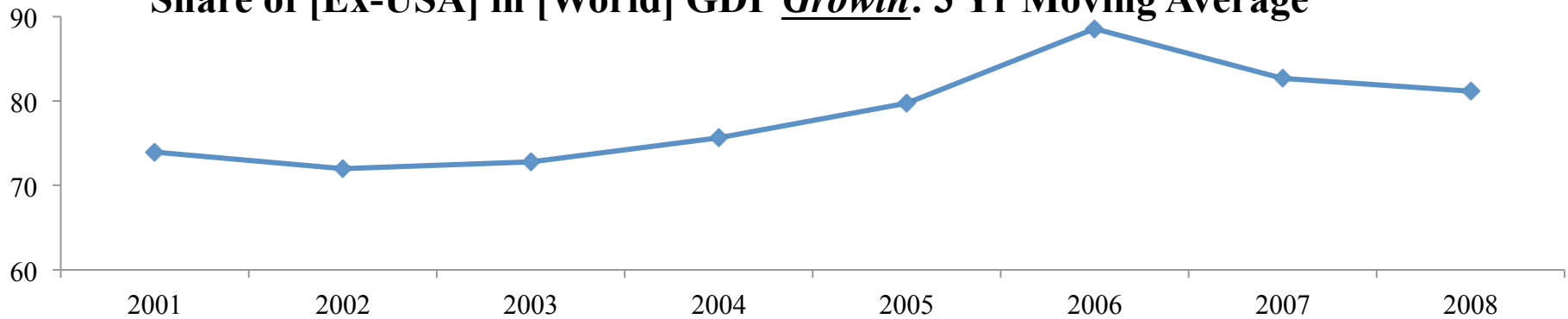


Major Driver of Stock Returns

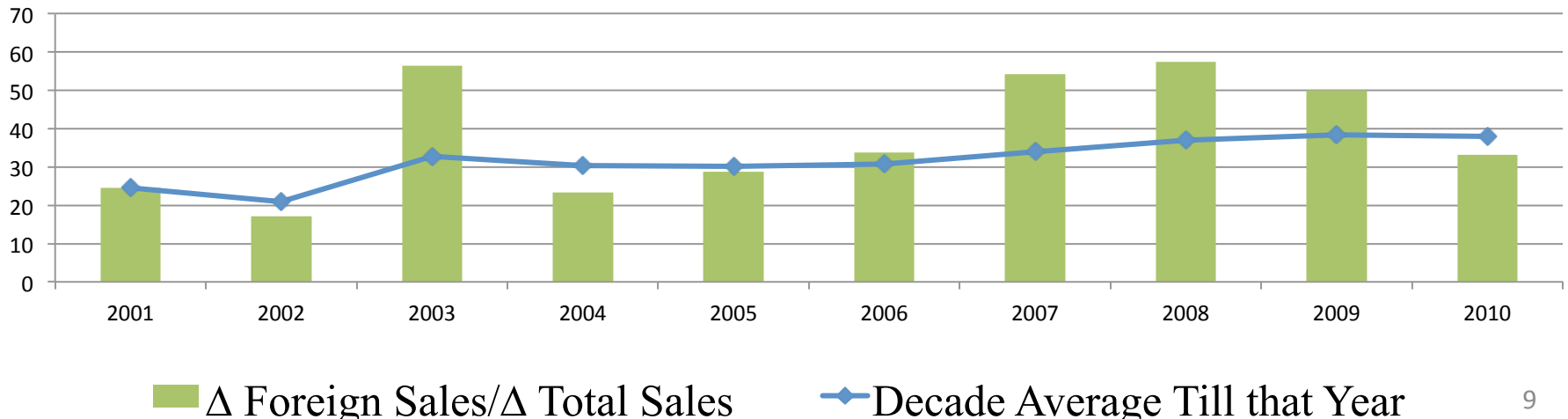
[Ex-USA] ~ 80% of the World GDP *growth*!

[Ex-USA] ~ 40% on average & ~ 60% of the S&P 500 earnings *growth* some years

Share of [Ex-USA] in [World] GDP Growth: 3 Yr Moving Average



Foreign Sales: A BIG Driver of Earnings Growth



■ Δ Foreign Sales/Δ Total Sales

◆ Decade Average Till that Year

International in little more detail !

2004 – 2010: Average Share in (Ex-USA)

| | S&P 500 (International Sales) | Stock Market Capitalization | GDP |
|-----------------|----------------------------------|--------------------------------|------|
| Americas ex USA | 28.6 | 10.6 | 12.6 |
| Europe | 22.7 | 42.2 | 45.2 |
| Asia | 11.8 | 44.5 | 38.9 |
| Other | 37.0 | 2.8 | 3.3 |

2004 - 2010: Annualized Growth Rate

| | S&P 500 (International Sales) | Stock Market Capitalization | GDP |
|-----------------|----------------------------------|--------------------------------|------|
| Americas ex USA | 2.2 | 16.8 | 12.4 |
| Europe | 3.4 | 3.3 | 4.5 |
| Asia | 9.8 | 15.1 | 8.6 |
| Other | 11.0 | 14.8 | 11.5 |

- Overweight Canada, Latin America, Underweight Europe. Fastest growth in Asia.
- Benchmarked to S&P 500: Benefit from high growth in LatAm, Asia, Emergingmks

Investing in international equities? – GDP growth rates, exchange rates, inflation rates are important investment considerations

Benchmarked to/ Invested in S&P 500? - In-effect making investment choices incorporating foreign exchange and GDP trends.

- Rising trend in the international sales of the S&P 500.
- But temporary dips in a few years – 2001, 2002, 2004 – Why?
- Logically a U.S. company would sell more units in the domestic market when
 - (a) U.S. GDP grew faster than the rest-of-the-world (ex-USA) ...or...
 - (b) when the U.S. \$ strengthened.

Similarly sell more units internationally when ex-USA GDP grows faster or the U.S. \$ weakens.

- I decomposed the U.S. dollar value of domestic and international sales into units of domestic and international sales by taking out the inflation and exchange rate effect.
- Estimate the share of foreign sales in *unit* terms.....compare that to macroeconomic trends each year.

| Year | Trade Wt \$ (Exchange rate) | Current Value Constant \$ 100 (Inflation) | Foreign Sales (units) Share % | (Ex-USA/World) GDP % |
|------|-----------------------------------|---|-------------------------------------|-------------------------|
| 2000 | 119.5 | 100.0 | 24.6% | 69.3% |
| 2001 | 126.1 ↑ | 102.9 | 24.1% ↓ | 68.0% ↓ |
| 2002 | 126.9 ↑ | 104.5 | 23.8% ↓ | 68.2% |
| 2003 | 119.3 | 106.9 | 27.4% | 70.4% |
| 2004 | 113.8 | 109.7 | 27.8% | 72.0% |
| 2005 | 110.8 | 113.4 | 29.1% | 72.4% |
| 2006 | 108.8 | 117.1 | 30.5% | 73.0% |
| 2007 | 103.6 | 120.4 | 34.1% | 74.9% |
| 2008 | 99.8 | 125.0 | 37.5% | 76.7% |
| 2009 | 105.7 ↑ | 124.6 | 33.6% ↓ | 75.8% ↓ |
| 2010 | 101.8 | 126.6 | 35.0% | 76.9% |

- S&P 500 unit foreign sales decreased in 2001, 2002 & 2009, mirrored a strengthening \$ and faster U.S. GDP growth. Business decisions by index companies incorporated GDP growth rates, exchange rate and inflation
- Implication: investor in S&P 500 in-effect making investment choices directionally similar to making international equity investments. 12

Sector Diversification versus Geographic Diversification

- Since late-1990s: industry diversification may provide risk reduction \geq from geographic diversification .
- Relative Sector Weights (RSW) to compare the sector distribution of a regional index_c (U.S & other geographic indices) to the World index.
- Region_c, $RSW_{i,t} = [Wt \text{ in Sector}_i \text{ in Regional index}_c / Wt \text{ in Sector}_i \text{ in World index}]$, year_t . $i = 10$ sectors under ICB classification, $c = [USA, Asia \text{ Pacific}, Europe, Latin \text{ America}]$
 $t = 12/31/YYYY$. (2000 - 2010, Latin America data starts in 2003)
- Region_c, table of RSW with the sector as rows & years as the column. Calculated the minimum, maximum & average RSW year-wise and sector-wise.
 Range of $RSW_c = [Minimum \ RSW_{i,t}, Maximum \ RSW_{i,t}]$.
 Average $RSW_c = Average [RSW_{i,t}]$ in regional index_c.

Summary of Relative Sector Weights

| | Minimum | Maximum | Average |
|---------------|---------|---------|---------|
| USA | 0.3 | 1.7 | 1.0 |
| Asia Pacific | 0.3 | 3.4 | 1.1 |
| Europe | 0.2 | 1.7 | 1.0 |
| Latin America | 0.0 | 3.8 | 1.2 |

- **Sector distribution of the “U.S” index most similar to that of the “global” index.**

Distribution of Monthly Arithmetic Returns

| | MXWDU (World-ex-USA) | SPX (S&P 500) | MXWD(World) |
|-------------------------------|----------------------|---------------|---------------|
| Mean | 0.41 | 0.11 | 0.26 |
| Pr > t for Mean =0 | 0.40 | 0.79 | 0.56 |
| Std Deviation | 5.45 | 4.64 | 4.96 |
| Median | 0.90 | 0.81 | 0.85 |
| Maximum | 13.14 | 9.39 | 11.48 |
| Quantile 3 (75%) | 4.01 | 3.15 | 3.46 |
| Quantile 1 (25%) | -2.92 | -1.98 | -2.43 |
| Minimum | -22.10 | -16.94 | -19.91 |
| Skewness | -0.80 | -0.67 | -0.78 |
| Kurtosis | 1.96 | 0.95 | 1.69 |
| Shapiro-Wilk | 0.96 *** | 0.97 *** | 0.96 *** |

T Test for Difference in Means

| $H_0: \mu_1 = \mu_2$ | MXWDU (World-ex-USA) & SPX | MXWD (World) & SPX |
|-------------------------------------|----------------------------|--------------------|
| P-Value for H_0 | 0.17 | 0.21 |

Autocorrelation of Monthly Returns

| | MXWDU (World-ex-USA) | SPX (S&P 500) | MXWD (World) |
|-------------------------------|----------------------|---------------|---------------|
| ρ_1 | 0.260 | 0.197 | 0.241 |
| ρ_2 | 0.042 | -0.059 | 0.003 |
| ρ_3 | 0.143 | 0.120 | 0.145 |
| Pr > ChiSq at lag 6 | 0.0158 | 0.1034 | 0.0319 |

2000 – 2010:

- Mean returns of MXWDU (Ex-USA) & SPX were statistically not different from zero.
- Difference in their average returns is statistically insignificant.
- Both were non-normal distributions with a negative skew.
- SPX had a higher minimum and 25th percentile return, and less negative skew, kurtosis .
- SPX had more efficient pricing (autocorrelation)

Main Conclusions

- Domestic investors achieve substantial international exposure through S&P 500 (by either investing in S&P 500 index funds or by benchmarking to it)
- The international business exposure of S&P 500 has evolved with a large & increasing fraction of revenue comes from international markets
- In 2010, almost 40% MW sales of S&P 500 was international
- 2000 - 2010, ~ 40% of earnings growth was from international markets. In some years as high as ~ 60%
- Benefits from fast growth in the emerging markets of Latin America and Asia
- Through S&P 500, a US investor follows global GDP & exchange rate trends
- Sector distribution of the U.S matches the 'World' more closely than any other major geographic bloc
- Ample geographic & sector diversification
- Economic reasons for the high degree of co-movement between S&P 500 & global indices
- S&P 500 returns similar to global benchmark, more downside protection, more efficient pricing (autocorrelation)
- S&P 500 an effective benchmark for an U.S. investor to easily get a lot of international diversification!