GLOBAL STRATEGIC RESEARCH

The Case for Asia

Rising productivity, higher valuations and the strategic imperative for investors
About JPMorgan Asset Management
Strategic Investment Advisory Group

The Strategic Investment Advisory Group (SIAG) partners with clients to develop objective, thoughtful solutions to the broad investment policy issues faced by corporate and public defined benefit pension plans, insurance companies, endowments and foundations. Our global team is one of JPMorgan’s primary centers for thought leadership and advisory services for institutional clients in the areas of asset allocation, pension finance and risk management.

The team’s expertise is supported by powerful analytical capabilities for conducting asset/liability, risk budgeting and optimal asset allocation analysis, in line with client-specific investment guidelines, risk tolerance and return requirements. In response to the changing needs of CFOs, treasurers and CIOs, our suite of tools has been expanded to include corporate finance-based risk management analytics for assessing and proactively managing the impact of the pension plan on the corporation as a whole.

SIAG brings a deep knowledge and understanding of capital markets behavior to all its advisory services, ensuring that results and recommendations have real-world consistency and can be tested under a variety of market scenarios. Strategic Investment Advisory Group services are offered as part of an overall asset management relationship to complement the many ways in which JPMorgan Asset Management provides clients with value-added insights.

About JPMorgan Asset Management

For more than a century, institutional investors have turned to JPMorgan Asset Management to skillfully manage their investment assets. This legacy of trusted partnership has been built on a promise to put client interests ahead of our own, to generate original insight, and to translate that insight into results.

Today, our advice, insight and intellectual capital drive a growing array of innovative strategies that span U.S., international and global opportunities in equity, fixed income, real estate, private equity, hedge funds, infrastructure and asset allocation.
“The goal is to challenge ourselves and our industry... to reach for insights and innovations that define new areas of opportunity for investors.”

FOREWORD

With this paper, we inaugurate a new publication series called “Global Strategic Research,” from the Strategic Investment Advisory Group at JPMorgan Asset Management.

In this new series, our mandate is broad, in a word—strategic. The goal is to challenge ourselves and our industry to think beyond today’s successes—to reach for insights and innovations that break new ground and define new areas of opportunity for investors.

Global Strategic Research will adopt an in-depth, hard-nosed research perspective, drawing on the firm’s thought leaders across asset classes and geographies. Our publications will investigate today’s most pressing ideas and investment approaches—and propose many novel ones of our own—based on economic intuition and rigorous quantitative methods.

This first paper focuses on Asia ex-Japan. In it, we present a unique strategic argument that rising productivity—and not GDP growth—is the key driver of sustainable investment opportunity in the region. The novelty of this paper is that it moves the discussion beyond the mere identification of potential sources of returns in Asia. It rigorously demonstrates cause-and-effect, i.e., the link between key sources and prospects of future investment returns.

In addition to public equities, we extend our discussion and analysis to private equity and infrastructure markets in Asia’s emerging and frontier economies. These latter areas have received little attention to date, but we believe they could present compelling opportunities for strategic investors.

All of these insights build on the firm’s intimate knowledge of Asian markets and our long history of expertise there. For more than 100 years we have been active participants—and in many instances leaders—in the financial services industry in Asia, from retail banking, to investment banking, to asset management.

In sum, this paper is a fitting introduction to a series that we hope will leverage our considerable global resources to their best advantage: breaking new ground, promoting the highest levels of discussion and debate, and helping our clients see the world of investment opportunity from new perspectives.

We thank you for your support and welcome your feedback on this new endeavor.

Rumi Masih
Abdullah Z. Sheikh
# TABLE OF CONTENTS

EXECUTIVE SUMMARY

1 INTRODUCTION
Is the Asian “Growth Miracle” an adequate investment thesis?

3 THE CASE FOR ASIAN EQUITIES
Driven by productivity gains, not economic growth

15 PORTFOLIO DYNAMICS
Practical implications for strategic investors in Asian public equity

19 PRIVATE EQUITY IN ASIA
Strong productivity-driven growth, manager selection will be key

25 INFRASTRUCTURE INVESTMENTS
Dynamic interplay among productivity, growth, and infrastructure markets

29 CONCLUSION
Based on a productivity thesis, investors should consider a strategic overweight to Asia.

31 ADDENDA
A: Minding the speed-bumps: Assessing the risks to China’s economy
B: Asia’s frontier markets: Opportunities for strategic investors

37 APPENDICES
A: Testing for cointegration and estimation of a vector error correction model
B: Exponential generalized autoregressive conditional heteroskedasticity
C: Developing a structural model for infrastructure return determination
D: Capital market assumptions underlying portfolio projections

BIBLIOGRAPHY
EXECUTIVE SUMMARY

Overweighting Asia ex-Japan is a strategic imperative—not a tactical play.
The arguments favoring investment in Asia have varied from using it as a portfolio diversifier, a tactical tilt, or perhaps as an “emerging markets” play.* Yet, none of these presents a compelling strategic case for a long-term commitment to the region as a whole, or makes an explicit link to domestic drivers of sustainable opportunity.

We believe now is the time to leave behind such piecemeal, tactical approaches to Asia in favor of a single long-term, strategic outlook. In this paper, we offer evidence that Asia is on the brink of a long-term economic and stock market boom—driven by rising levels of productivity—which will provide investment opportunities within and beyond its public equity markets.

As a result, we believe that investing in Asia should be treated as a core strategic portfolio allocation—not as a tactical opportunity or a diversifier—and that investors should consider investing in this region as a strategic imperative.

It is not about growth.
Today’s catch-phrase in Asian investing is “GDP growth,” viewing Asia as a “growth play.” It is the clearest attempt yet to establish a long-term strategic case for Asia. However, GDP growth in itself is not a reliable indicator of higher equity valuations; in fact, the two are negatively correlated.

Productivity is the key link to higher equity values.
We believe that the investment case we develop here is unique. It has many moving parts as we are looking at investments across different asset classes: public equity, private equity, and infrastructure.

But they all add up to one key take-away for investors: We believe that productivity increases will spark a new cycle of investment, economic growth, and prosperity that will benefit all participants, public and private.

In this paper, we offer rigorous economic and quantitative analysis of the relationship between productivity and equity valuations in Asia. Beyond the intuition that both are related, we demonstrate that:
• Productivity increases have a tangible impact on the price-to-earnings (P/E) ratio, a key driver of equity returns
• This relationship is reciprocal: productivity improves equity valuation, which increases productivity, and
• The effects of such increases are permanent.

Structural drivers are in place to support a long-term revaluation trend.
We offer evidence that the structural reforms driving productivity gains in Asia will remain in place, continuing to enhance productivity throughout the region. Therefore, Asian equity markets should benefit from increases in price-to-earnings ratios over the long term.

* We use the term “Asia” to refer to the region’s economies, excluding Japan.
EXECUTIVE SUMMARY (CONTINUED)

Long-term risk adjusted returns should compensate investors for short-term volatility.
We demonstrate that increasing equity allocations to Asia can result not only in higher expected returns, but also improved worse case portfolio outcomes. The increased returns combined with diversification benefits can provide incentives for strategic investors to ride out any short-term volatility as they reap the longer-term rewards.

The impact of a global slowdown or Chinese inflation on revaluation potential should be marginal.
In our view, this revaluation potential is so strong that a developed world-led economic slowdown should have a marginal impact on the growth potential of the region. Furthermore, domestic demand-driven inflation should be contained and have a muted impact on aggregate pricing pressure.

Higher productivity is a key driving force in private equity market growth.
We illustrate through empirical modeling that productivity growth—along with other factors—is also a significant driver of Asian private equity markets. We identify good manager selection as the key mechanism through which investors will profit from a rapidly expanding Asian private equity market.

Infrastructure investment contributes to and benefits from productivity growth.
We generate empirical evidence by employing econometric models to disentangle the impact of infrastructure on the economy at an aggregate level. We find a feedback mechanism whereby higher infrastructure development leads to higher levels of productivity and economic growth, which further leads to higher levels of infrastructure development.

Asian frontier markets also offer investors alpha potential for the future.
Frontier markets tend to be smaller, less liquid and to have a lower GDP per capita than established emerging markets. We believe that frontier market returns are dominated by idiosyncratic risk, which makes them a compelling case for return diversification.

In summary, we offer a unique case for Asia as one of the most attractive strategic opportunities among global markets—based not on GDP alone, but on underlying productivity growth dynamics that we believe are fueling a long-term revaluation trend. In our view, investors should consider Asia as a core strategic allocation and can look to public equity, private equity, and infrastructure markets, across Asia’s emerging and frontier economies, for opportunities to participate in the region’s compelling long-term investment prospects.
INTRODUCTION

IS THE ASIAN “GROWTH MIRACLE” AN ADEQUATE INVESTMENT THESIS?

It is hard to ignore the economic growth phenomenon that has unfolded throughout Asia ex-Japan (hereafter, Asia) over the past two decades.

China has maintained a robust and progressive economic growth rate since the inception of its economic reform programs in the late 1970s through early 1980s—outperforming even the Asian “miracle” created by the Newly Industrialized Economies in East Asia from the 1960s to the late 1980s. China became the world’s fastest-growing economy from 1995 to 2007, growing at an average rate of 9.6% each year, hailed by The Economist (2005) as the “great leap forward” and “a model of reform.”

India’s real GDP growth, although lower than China’s, has been 6.9% on average since 1995, constantly above 4% for the last three years (in real terms). Adjusted for purchasing power parity, India is the fourth largest economy, after the United States, China and Japan.1

This very strong growth is not limited to China and India. Indeed in 2007, all countries in Asia have grown at least twice as fast as the United States (in real terms):

- Over the last four years, each of the Eastern Region New Industrialized Economies’ GDP (South Korea, Taiwan, Singapore, and Hong Kong) consistently grew at a rate above 3%.
- Over the last three years, GDP growth in Asia’s Frontier Markets was consistently over 5% per year.2

So what kind of opportunity does this “growth miracle” present to investors?

Exhibit 1: Real GDP growth in Asia has been consistently higher than in the U.S.

Challenging conventional wisdom

Conventional wisdom dictates that investors seeking high returns should invest in countries that are predicted to have high rates of economic growth, investment, and production. Such countries should offer a wider set of opportunities for investors to exploit abnormal returns. Economic growth should have a positive impact on companies’ earnings, logically resulting in higher returns for shareholders.

If we accept the idea that recent Asian growth will continue or that it represents the beginning of a decades-long trend, Asian countries lend themselves to this wisdom very logically. And the big question for investors becomes:

Is this conventional “growth argument,” on its own, sufficient to drive long-term strategic allocations to Asia?2

We would answer, “no.”

---

1 Adjusting for differences in purchasing power provides a better measure of the living standards between countries. It is considered a superior measure to GDP per capita when comparing income levels between countries, because it allows for differences in costs of living.

2 Our definition of Asia’s Frontier Markets includes Bangladesh, Kazakhstan, Pakistan, and Sri Lanka.
Contrary to popular wisdom, economic growth is not an accurate proxy for equity returns, and therefore not a sufficient investment thesis for driving allocations to Asia.

**Productivity: A provable thesis for investing in Asia**

Is there an investment thesis strong enough to drive long-term portfolio allocations to Asia? We believe there is.

We believe Asia represents one of the most attractive strategic opportunities in global markets—with valuations set to rise faster than developed markets—due to steady increases in productivity, not GDP. We also demonstrate the link between productivity gains and growth in private equity and infrastructure markets.

In this paper, we connect rising productivity to increases in price-to-earnings (P/E) ratios—the latter being a key driver of equity returns. We believe that steady increases in productivity throughout Asia will drive valuation appreciation over the medium and long term, creating opportunity that is unlikely to be matched by any other markets or regions.

---

1 Throughout the paper, we define productivity as the ratio of output to inputs. Our measure of productivity is labor productivity, defined as “real” output divided by inputs (measured in terms of “hours worked” for developed countries and “persons employed,” for developing countries). Labor productivity also captures “multi-factor productivity,” which is the effect over time of factors such as technological progress, rising education standards, and changes to the socioeconomic environment.

2 We define the price-to-earnings ratio as the current market price divided by the historic annual net profit.
The question of what should be driving investors’ decision-making prompted us to investigate the potential sources of real equity returns in Asia. 

Our goal was to identify the most significant of these sources and provide an intuitive and econometric link to higher equity returns for investors. Our research points to productivity gains as the key source, and P/E growth as the key driver through which investors in Asian public equities should realize high real returns over the long term.

Based on this assessment, we construct our argument for an overweight to Asia with the following four components:

1. Economic growth is not sufficient on its own to drive long-term equity returns: The two are negatively correlated over the long term.
2. There is, however, a strong linkage between productivity and P/E growth, which, in our view, is a long-term driver of equity returns.
3. Asian productivity gains over the last decade are expected to continue.
4. Empirical analysis and econometric modeling, based on observed data in Asia, show that productivity shocks can lead to permanent, long-term increases in P/E.

According to our thesis, investors should be rethinking their allocations to Asia.

The region’s future revaluation potential represents a fundamental, strategic, long-term opportunity: not just an “emerging markets” play, or a tactical tilt, or even a pure diversifier.

We believe Asia is embarking on a regime of fundamental long-term equity growth—driven by gains in productivity—and we make the case throughout the first two sections of this paper.

Economic growth and equity returns: A negative correlation

Over the short run, evidence suggests that changes in economic growth do impact stock prices. This impact, however, can be cyclical in nature and does not necessarily translate to permanent increases in valuations.

In fact, we only need to look at a single statistic to understand that economic growth is not a reliable indicator of long-term potential equity returns: the correlation between real per-capita GDP growth and compounded real equity returns, for 16 countries over the period 1900 to 2002 (representing over 90% of world market capitalization), is -0.37.5

While this negative correlation may seem disconcerting to some, there are a variety of factors that could be leading to this result:

1. Stock markets are highly efficient at building in information regarding future potential, i.e., growth expectations are gradually “priced into” long-term valuations, so the market does not react strongly to changes in growth; short-term fluctuations are much more often a response to changes in risk.
2. While economic growth could lead to financial development that benefits consumers and workers, it may not directly benefit shareholders.

The disconnect between growth and equity returns is born out by the argument that in a competitive economy, the positive side effects of growth, such as technological progress, higher living and social standards, largely benefit consumers rather than the owners of capital.6

---


Although consumers may enjoy relatively higher savings resulting from higher growth rates, and may invest a large proportion of their savings in the equity market, this translates into higher amounts of capital per unit of labor, which ultimately results in higher real wages. While this process impacts favorably on labor and consumption patterns, the dynamics do not necessarily lead to higher values of dividends per share for shareholders.

P/E and productivity: Drivers of stock market booms

If we cannot cite economic growth as a driver of higher equity returns, can we find another, more reliable indicator?

Yes.

We believe the argument for higher equity returns rests on the prospect of productivity-driven growth in price-to-earnings (P/E) ratios.

The sequence of events is illustrated in the flow diagram in Exhibit 3.

This dynamic model implies a specific set of events:

- First, the prospect of higher productivity drives up the market value of firms, due to higher expected future profits, thus resulting in an increase in P/E.
- At the firm level, due to higher market values, financing constraints become relaxed and firms find new potential to operate at a higher level of labor and capital.
- If we aggregate to the industry level, this pushes up the demand for new labor and ultimately results in labor putting upward pressure on wage rates.
- Entrepreneurs react by implementing innovative production plans to increase productivity of existing labor at the margin.
- While successful firms expand, those that fail (or whose traditional practices do not yield enhanced productivity) eventually contract and exit the industry.
- This results in what we refer to as a “reallocation” effect where more efficient firms engage in practices yielding even higher levels of labor productivity.

In addition to this effect, we also see an increase in capital intensity, or an increase in the amount of capital per unit of labor.

In sum, this framework suggests a “virtuous circle” in which higher productivity is driven by expectations of higher productivity. We believe this framework can be applied to a number of economies where there is a potential for higher productivity: i.e., where higher

---

Exhibit 3: A “Virtuous Circle” with productivity growth as a key driver

We can characterize a Virtuous Circle by the following attributes:

- High growth rates of output, employment, investment and wages
- Robust growth rate of labor productivity
- A stock market boom
- A financing boom for new and expanding firms
- Structural and behavioral changes enhancing the ability of firms to avoid imbalances in inventories.

Source: JPMorgan Asset Management.

---

7 This has been documented on research showing that the mere prospect of high future productivity growth can generate significant gains in current productivity. See Urban J. Jermann and Vincenzo Quadrini (2007), “Stock Market Boom and the Productivity Gains of the 1990s,” Journal of Monetary Economics, Vol. 54, pp. 413–432.
productivity leads to higher valuations, which in turn lead to higher productivity.

To analyze the link between equity returns and productivity-driven P/E growth, we begin with the U.S. experience, where there is sufficient data to enable robust analysis. Exhibit 4 plots average labor productivity growth and the price-to-earning ratio in the post-World War II United States. The figure shows clearly how the period can be divided into three regimes:

1. Rapid acceleration in productivity during the 1960s (the “Golden Age”)
2. A slowdown following the exogenous supply-side energy shocks of the early 1970s, and
3. A resurgence from the early to mid-1990s onward, which we refer to as the revival period, or the “New Economy.”

The “New Economy” boom in the United States in the 1990s was, with the “Golden Age” in the 1960s, one of two key growth periods in modern U.S. history. Rapid economic expansion was accompanied by a stock market boom, as well as a financing boom for new and expanding firms.

The last U.S. regime (i.e., the “New Economy”) saw a number of events benefiting owners of capital—events that we believe were driven by the prospect of future productivity growth.

Our analysis also extends to other developed economies. In the case of Japan, for example, we are able to identify two distinct economic regimes:

- The period from 1960 to 1973, characterized by high productivity growth of 8.1% per year on average, and compound public equity market returns averaging 12.3% per year.
- The period from the first major oil shock in 1973 onwards, marked by a decline in productivity growth to an average of 2.5% per year and compound public equity market returns of only 5.2% per year.

---

8 Based on Tokyo Stock Price Index returns from 1960 to 2007 sourced from Datastream.
Of course, a rise in productivity was one of a number of factors that contributed to periods of success within these developed economies. However, recognizing the existence of these economic regimes offers a platform from which we can provide a theoretical construct with validity beyond the United States, namely in Asia.

Productivity in Asia: A clear picture of hidden potential

In the previous section, we identified productivity as a key driver of economic expansion and high potential equity returns. We believe that impressive recent productivity gains are compelling evidence that this factor for change is in effect in Asia today. Moreover, we believe that the region can expect continued productivity gains for the medium term, setting the stage for rising equity valuations in Asia.

Let us start with a review of recent productivity growth for seven emerging markets compared with the United States (Exhibit 5). Here, two of the most impressive results—for India and China—largely reflect structural improvements in capital deepening and input use efficiency.

Exhibit 5: Impressive Chinese and Indian productivity growth from 1996 to 2006 reflects structural improvements in capital deepening and input use efficiency


We believe that such productivity gains will continue across the Asian region, driven by a wide range of factors, such as those we briefly explore here.

- **Macro-political and economic trends:** Trend productivity is enhanced by macro-political and economic developments, such as trade liberalization, privatization of state-owned enterprises, and the movement of labor from predominantly agricultural production to industrial manufacturing.

  China’s entry into the World Trade Organization (WTO) is one such example. And in India, it has been estimated that urbanization could increase Indian productivity by 1.2% a year, as workers shift from the agricultural sector to the service sector, where productivity is estimated to be four times higher.

- **Investment in infrastructure and other productivity supporting initiatives:** Authorities in Asian countries have recognized the need to invest in growth-supporting initiatives, such as infrastructure services. Infrastructure growth has sparked an increase in domestic production of primary materials (e.g., steel and cement); competing with foreign producers has, in turn, driven greater efficiency and lower prices for domestic production, which has contributed to productivity increases.

  And infrastructure spending is climbing throughout the region, e.g., India has committed to continuing its increase in infrastructure spending, which is slated to rise from 3.4% of GDP in 2007 to 9% by 2012.

- **A spill-over effect from the larger regional economies to smaller ones:** Spectacular increases in productivity have also brought downward pressure, not only on the costs of goods but on the costs of the factors of production, especially in the large economies of India and China. Given the high level of intra-regional trade (Exhibit 6), this effect should...
spill over to create downward pressure on production input costs throughout the region—a further enhancement to productivity.

Exhibit 6: Increased intra-regional trade should help spread the benefits of the downward pressure on costs resulting from high productivity gains

<table>
<thead>
<tr>
<th>Year</th>
<th>NAFTA</th>
<th>EU15</th>
<th>Asia</th>
<th>Emerging Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>2006</td>
<td>40%</td>
<td>35%</td>
<td>40%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Sources: IMF, Direction of Trade Statistics. As of 12/31/06.
Notes: NAFTA refers to the North American Free Trade Agreement; EU15 refers to the 15 original members of the European Union, prior to the May 2004 expansion; Asia refers to Asia, including Japan; Emerging Asia refers to Asia, ex-Japan.

Targeted investment in “intangibles” through higher R&D spending: Finally, increased openness to trade, large-scale financial deepening and targeted investment in the information and communications technology (ITC) sector (particularly in the case of India) have been pivotal drivers of the pace of productivity growth.

This last element is key, as investment in technology advancement constitutes a growth in “intangibles,” which has been cited by a number of prominent economists as a key driver of productivity.11

Essentially, intangibles are defined as technical and entrepreneurial knowledge that grows out of a commitment towards research and development. By definition they cannot be measured. Rather, they evolve out of the application of certain factors of production. For example, during the technology-led U.S. economic expansion in the early to late 1990s, investment in ITC equipment led to investment in unmeasured complementary intangibles such as organizational restructuring and innovations in production line efficiencies.

Intangibles have a positive impact on company margins. For example, it has been demonstrated that technology innovations reduce the price of inputs relative to economy-wide aggregate output prices. This directly impacts a firm’s margins, which increases productivity of capital.

The primary driver of intangibles is research and development (R&D), and here we see a strong historic trend of rising investment, as well as projected escalating growth rates for medium-term R&D spending.

In China, for example, the government is committed to home-grown technologies, which will add value to Chinese products. The vision is that China, through R&D expenditures, should enter the top twenty countries to qualify as an “innovative nation.” It has also committed itself to R&D spending growth of 21% per annum over the next three years—increasing R&D spending from 1.5% of GDP in 2007 to 2.1% by 2010 (Exhibit 7). In fact, China’s growth in R&D expenditures is expected to outstrip nominal GDP growth over the next 15 years.

Exhibit 7: China’s R&D spending growth is expected to outstrip the growth rate of nominal GDP over the next few years

Projections suggest that China’s productivity growth is unlikely to drop below its current level for at least the next five years. It will likely stabilize when the economy settles on a stable, sustainable growth path, assuming no major external shocks by way of a prolonged global economic slowdown.\(^\text{12}\)

And on balance—based on the drivers described above, among others—we see historical growth in productivity not only continuing, but spreading throughout the region as smaller economies begin catching up to the larger ones.

The net result is that we view Asia’s productivity trend as sufficient to set the stage for a new regime of economic expansion and market revaluation.

**Asia’s productivity gains: Leading to higher P/E ratios and a stock market boom**

So far we have argued that high productivity growth can lead to a stock market boom, as well as a financing boom—an overall dynamic that allows an economy to shift to a new strategic regime of economic expansion.

In fact, as illustrated in Exhibit 8, we see compelling evidence that such a regime is already underway in Asia.

In this next section, we:
- Demonstrate a causal relationship between productivity and P/E ratios in Asia, the latter being a key driver of equity returns, and
- Offer evidence that productivity gains in Asia can drive permanent, long-term growth in P/E.

There are, to be sure, limitations on available data from these markets, e.g., P/E ratios begin in 1990, in line with the start of stock market liberalization. Statistics on productivity, however, stretch back to cover the last 45 years.

But using available productivity data, we were indeed able to identify three regimes for both China and India. We define the three regimes as:
1. Closed economies
2. Pre-liberalization, and
3. The onset of a new economic regime similar to the “Golden Age” and “New Economy” seen in the United States.

Exhibits 9 and 10 illustrate these regimes for China and India, respectively. (*Note: Data limitations prevent us from overlaying P/E ratios for the entire time horizon. However, we believe that the segment of data we have is sufficient for the purpose of empirical analysis.*)

---

**Exhibit 8: China and India at the onset of a new economic regime**

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>Annual growth over period</th>
<th>India</th>
<th>Annual growth over period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Productivity is stronger</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real GDP per worker</td>
<td>$3,476</td>
<td>$9,961</td>
<td>$3,299</td>
<td>$6,198</td>
</tr>
<tr>
<td></td>
<td>+7.3%</td>
<td>+3.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stock markets are deeper</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock market capitalization as % of GDP</td>
<td>0.5%</td>
<td>34.8%</td>
<td>8.1%</td>
<td>68.6%</td>
</tr>
<tr>
<td></td>
<td>+32.0%</td>
<td>+12.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Investments are increasing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Direct Investment inflow as % of GDP</td>
<td>1.2%</td>
<td>3.5%</td>
<td>0%</td>
<td>0.8%</td>
</tr>
<tr>
<td></td>
<td>+7.7%</td>
<td>+19.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Economy is growing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real GDP (in millions)</td>
<td>$2,264</td>
<td>$7,522</td>
<td>$979</td>
<td>$2,614</td>
</tr>
<tr>
<td></td>
<td>+8.3%</td>
<td>+5.6%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


---

\(^{12}\) We explore the vulnerability of the Chinese economy to a developed economies slowdown. For details, see Addendum A.
Exhibit 9: Productivity leading P/E in China


Exhibit 10: Productivity leading P/E in India

Using formal statistical techniques, we first test for the presence of a long-run equilibrium relationship (known as cointegration) between productivity and P/E ratios in both China and India. We are able to identify such a relationship, however, we also need to address the issue of “causation” between productivity and “P/E,” i.e., which one is driving the other?

To determine causation, we construct a simple econometric model that relates changes in productivity to past changes in both productivity and P/E; the model also measures deviations in productivity and P/E from their long-run relationship. The novelty of this model is that it allows us to relate the short-run relationship between two or more factors to its long-run dynamics, all within the same system. (This model is referred to as a “vector error-correction model” and described in some detail in Appendix A.)

Based on this model, and using annual data for both productivity and P/E ratios in China and India from 1995 to 2006, we find the following results (see Exhibit 11):14

1. For both China and India, P/E and productivity share a stable, long-run relationship,
2. For India, we find evidence of a short-run feedback relationship between P/E and productivity,
3. For both China and India, we find evidence of a long-run causal relationship of productivity changes leading P/E changes.

We now extend our analysis to other Asian economies, in each case testing for a strong long-run link (i.e., cointegration) and the direction of causality between productivity and P/E. We recognize that our collection of economies includes countries at varying stages of development. However, identifying this key link in other Asian markets should lend support to our investment thesis of productivity-driven P/E changes across the region.

The results of our analysis, shown in Exhibit 12, are threefold:

- We find evidence of long-run causality (with changes in productivity leading to changes in P/E) in the cases of Singapore, Indonesia, and Malaysia.

### Exhibit 11: Results show productivity leading P/E in a long-run relationship in China and India

<table>
<thead>
<tr>
<th>Country</th>
<th>Long-Run Relationship</th>
<th>Direction of Causality</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Yes (High)</td>
<td>Inconclusive</td>
</tr>
<tr>
<td>India</td>
<td>Yes (High)</td>
<td>Two-Way Feedback</td>
</tr>
</tbody>
</table>

Source: JPMorgan Asset Management analysis.

Notes: “High” refers to the level of statistical significance being above the 1% level. “Inconclusive” refers to the fact that we could not, based on the specification of the model, statistically discern a significant linkage. See Appendix A for model details.

### Causation and Feedback

**Causation** is a stronger form of inference than correlation. Correlation explains how strongly two variables are related at the same time, but does not provide information on which one causes the other one to change. Causation shows how one variable may drive the other, while the latter is lagging the first one. This is a “lead-lag” relationship.

One could observe both variables have an impact on each other, i.e., an increase in the first variable will lead to an increase in the second one, while an increase in the second one will also result in an increase in the first one. We refer to this as evidence of a **two-way feedback relationship**.

Empirical evidence supports a causal link, with productivity gains leading P/E gains.
In South Korea we find no evidence of a long-run relationship between the two factors, but short-run results seem to suggest a feedback relationship.

In the case of Pakistan, despite no clear evidence to support the presence of a long-run relationship, we find compelling evidence to suggest that productivity changes lead P/E changes over the short run.

While this causal relationship—from productivity to P/E growth—identified across Asia is novel in itself, for our investment thesis to hold, we need to test whether increases in productivity lead to permanent changes in P/E ratios. Such a result would lend support to our “virtuous circle,” whereby prospects of higher productivity lead to even higher productivity in the future, inducing permanently elevated levels of P/E.

In reality, although the side-effects of higher productivity are observed over a period of time, productivity itself tends to arrive in relatively short spurts or “shocks.” To test whether such shocks lead to permanently higher P/E, we apply a one-standard deviation shock to productivity at time zero and gauge its impact on the path of P/E ratios—focusing on how the shock plays out over a 10-year horizon.  

Our results for China and India are shown in Exhibit 13.

To interpret the results, we focus on the shape and magnitude of the response, which is expressed in terms of the standard deviation of P/E. Our results for both China and India indicate that a one-off positive shock to productivity at time zero leads to higher initial P/E ratios at time one. Furthermore, results show:

- In the case of China, P/E ratios fall for two years before picking up again to remain at an elevated level for the remainder of the ten year period, relative to pre-shock levels.
- In the case of India, after a sharp initial increase, P/E ratios fall slightly but remain at elevated levels for the duration of the ten years, relative to pre-shock levels.
In both cases, the impact on P/E of a shock to productivity is positive in the long term.

Although these results support our earlier arguments, before drawing broader conclusions, we apply the same analysis to all our Asian economies. As before, we test whether the productivity shocks have a temporary or permanent impact on P/E.

We find that in three of the other five Asian countries—Singapore, Indonesia and Pakistan—productivity shocks lead to permanently elevated levels of P/E ratios. We are not able to verify this for two countries, namely, South Korea and Malaysia, where the response of P/E to productivity shocks is transitory.

On balance, our results strongly support our thesis that higher productivity leads to permanently higher P/E ratios in Asia.

Exhibit 14: Simulated positive productivity shocks show P/E gains are permanent throughout most of Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Impact on P/E</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Permanent</td>
</tr>
<tr>
<td>India</td>
<td>Permanent</td>
</tr>
<tr>
<td>Singapore</td>
<td>Permanent</td>
</tr>
<tr>
<td>South Korea</td>
<td>Transitory</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Permanent</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Transitory</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

Source: JPMorgan Asset Management analysis.

Exhibit 15: Productivity is a long-run driver of P/E ratios across countries and time

<table>
<thead>
<tr>
<th>Factor</th>
<th>Expected sign of influence</th>
<th>Actual sign of influence</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>Positive</td>
<td>Positive</td>
<td>Very significant</td>
</tr>
<tr>
<td>Oil Price</td>
<td>Negative</td>
<td>Negative</td>
<td>Significant</td>
</tr>
<tr>
<td>Foreign Direct Investment</td>
<td>Positive</td>
<td>Neutral</td>
<td>Not significant</td>
</tr>
<tr>
<td>Savings</td>
<td>Positive</td>
<td>Neutral</td>
<td>Not significant</td>
</tr>
<tr>
<td>Inflation</td>
<td>Negative</td>
<td>Neutral</td>
<td>Not significant</td>
</tr>
<tr>
<td>Interest Rates</td>
<td>Negative</td>
<td>Neutral</td>
<td>Not significant</td>
</tr>
</tbody>
</table>


Notes: Estimation of the panel was performed using Ordinary Least Squares on an annual dataset from 1990 to 2006 inclusive. Interval of available data varies by country.

So far, our analysis has been confined to individual countries. And while the results for individual countries are robust for the sample period, the techniques employed so far do not exploit the cross-country dimension of the data set. In addition, our simple model did not allow for a host of other factors that could also influence P/E. Incorporating these two aspects of the available information set into our model allows us to make an even stronger inference regarding productivity-driven P/E ratios for the region as a whole.

So, to enhance the power of the model and improve the level of conviction in applying these results across the region, we pool annual data from 1990 to 2006 across 12 countries (interval of available data varies by country). We develop a simple panel model that explains P/E ratios as a function of productivity, oil prices, foreign direct investment, savings, inflation, and global interest rates. The panel model isolates the relationship of each variable to P/E by holding all the other variables constant.

Not surprisingly, our results (Exhibit 15) suggest that oil prices have a significant and negative relationship with P/E ratios. This is to be expected, given that our period of analysis includes a record 8-fold increase in crude oil prices (from $11 a barrel in March 1999 to $90 a barrel in December 2007). This increase led to significantly higher energy costs for all oil importers—including the rapidly growing Asian economies we included in our analysis.16

16 See Addendum A, “Minding the speed bumps” for a further exploration of the potential impact of higher commodity prices on inflation.
Of primary importance to our thesis, we find productivity to be very significant in explaining P/E ratios. In addition, the direction of influence is positive—in line with our expectations. Combined with our prior results, which established historic and forward-looking dependence, we can now establish—with a high degree of statistical significance—that on average, an increase in productivity in Asia leads to a permanent increase in P/E.

The correct investment thesis for Asia: Productivity driving higher valuations and strong long-term returns

Investors in search of a viable investment thesis for Asia need look no further than the region’s steady, impressive gains in productivity.

As in the two economic regimes in the United States (the 1960s “Golden Age” and 1990s “New Economy”), we believe that productivity gains in Asia will drive a virtuous circle of P/E gains and booms in financing and investment, leading to gains in output and further gains in productivity.

Our evidence, gleaned from across Asia, supports our argument that there is a positive long-run casual link from productivity gains to higher P/E ratios and that these effects tend to be permanent.

Given evidence of continuing strong productivity gains in Asia for the medium and long term, we see valuation growth in these markets for the foreseeable future: certainly with higher potential for risk-adjusted returns than available in developed markets.

For investors, this analytical approach provides a clear, viable and rigorous thesis on which to build a strategic approach to investing in Asia. This is far more compelling than the broadly accepted yet unproven “growth argument” driving more tactical allocations to Asia today.
This page intentionally left blank.
PORTFOLIO DYNAMICS
PRACTICAL IMPLICATIONS FOR STRATEGIC INVESTORS IN ASIAN PUBLIC EQUITY

So far, we have argued the case for an overweight position to Asian equities, based on the notion that Asia is at the beginning of a long-term economic regime in which productivity-driven P/E growth will drive higher equity valuations.

Based on this thesis, we propose that the strategic view of allocations to Asia needs to change, i.e., an allocation to Asian equity should be seen as a “core” equity allocation, and not merely as a diversifier, a tilt, or an emerging markets or “economic growth” play. We believe that Asia deserves to be considered relative to its natural global market cap allocation or perhaps even as an explicit portfolio overweight above its market cap allocation.

In the following analysis, we model an explicit overweight to Asia ex-Japan equity at the total portfolio level to illustrate the potential benefits and risks involved.

The hypothetical portfolio

With a hypothetical investor portfolio of $1 billion, we consider two investment scenarios17 (Portfolio A “No Asia” and Portfolio B “With Asia”), with allocations as shown in Exhibit 16.

The only difference between Portfolios A (No Asia) and B (With Asia), is that Portfolio B (With Asia) allocates $100 million (or 10%) to Asian equities, moving away from domestic and international equity in equal U.S. dollar amounts. This represents a strategic overweight position to Asia.

This is a significant overweight: based on a pure market cap-based approach, the allocation to Asia would be approximately 4% of the entire portfolio, or 7% of the portfolio’s 60% allocation to equities.18 Comparatively, a portfolio allocation of 10% represents an intentional (+6%) overweight position to Asia.

The framework and projected results

Our analysis of Portfolios A and B considers a range of possible future return scenarios developed using a stochastic “Monte Carlo” simulation model. The model generates 500 “random,”19 normally20 distributed returns annually over a ten-year period, based on the asset allocations in Exhibit 1621 and our capital market assumptions.22

Exhibit 16: Comparing hypothetical portfolios with and without Asian equity

<table>
<thead>
<tr>
<th>Asset class</th>
<th>Portfolio A No Asia</th>
<th></th>
<th>Portfolio B With Asia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$ million</td>
<td>%</td>
<td>$ million</td>
<td>%</td>
</tr>
<tr>
<td>Bonds</td>
<td>300</td>
<td>30</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>U.S. aggregate bonds</td>
<td>300</td>
<td>30</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>Equity</td>
<td>600</td>
<td>60</td>
<td>600</td>
<td>60</td>
</tr>
<tr>
<td>U.S. diversified equity</td>
<td>400</td>
<td>40</td>
<td>350</td>
<td>35</td>
</tr>
<tr>
<td>Int’l developed equity</td>
<td>200</td>
<td>20</td>
<td>150</td>
<td>15</td>
</tr>
<tr>
<td>Asia ex Japan equity</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Alternatives</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>U.S. REITs</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>1,000</td>
<td>100</td>
<td>1,000</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: JPMorgan Asset Management. Illustrative purposes only.

---

17 For simplicity, we assume there are no cash flows into or out of the portfolio. Hence, we need not allow for the timing of any cash flows on total return calculations.
18 Based on weights derived from MSCI AC World Index. As of March 31, 2008.
19 By which we mean “pseudo-random,” given our random number generator requires pre-determined seed value.
20 We address the issue of non-normality in the next section.
21 For the purposes of our analysis, we assume annual rebalancing. In other words, deviations from the strategic asset allocation benchmark are negated at the end of the year by selling overweight positions and buying underweight positions in the respective asset classes.
22 For details of our capital market assumptions, please see Appendix D.
To better capture uncertainty associated with the future, we present percentiles (or probabilities)—rather than just averages—for projected (real) portfolio values:

- The “upside” to the investor in our analysis is captured by the 95th percentile.
- The “downside” to the investor is captured by the 5th percentile portfolio value.
- Between the two extremes lies the “median” portfolio value, the most probable portfolio value at the end of the 10 years (based on our assumptions). The difference between the projected 95th percentile (upside) and 5th percentile (downside) is the “spread” of portfolio outcomes.

**Exhibit 17** shows our projections of (real) market values for Portfolios A and B at the end of a ten-year period.

**Exhibit 17: An allocation to Asia improves median and worse-case portfolio outcomes**

<table>
<thead>
<tr>
<th>Market value of assets ($ millions)</th>
<th>Portfolio A (0% Asia equity)</th>
<th>Portfolio B (10% Asia equity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>95th percentile (upside)</td>
<td>$2,541</td>
<td>$2,652</td>
</tr>
<tr>
<td>Upper quartile</td>
<td>$2,029</td>
<td>$2,092</td>
</tr>
<tr>
<td>Median</td>
<td>$1,690</td>
<td>$1,652</td>
</tr>
<tr>
<td>Lower quartile</td>
<td>$1,379</td>
<td>$1,359</td>
</tr>
<tr>
<td>5th percentile (downside)</td>
<td>$1,071</td>
<td>$1,085</td>
</tr>
</tbody>
</table>

Source: JPMorgan Asset Management. Note: Portfolio A (No Asia) has an expected real compound return of 5.2% per annum (p.a.), volatility of 8.9% p.a. and Sharpe ratio of 0.40. Portfolio B (With Asia) has an expected real compound return of 5.5% p.a., volatility of 9.4% p.a. and Sharpe ratio of 0.42. Assuming a risk-free real return of 2.0% p.a.

**Portfolio analysis: Long-term results**

The most conservative way to compare the relative merits of Portfolios A and B requires leaving aside upside potential, looking instead at projected median portfolio values (most likely outcomes) as well as projected downside portfolio values (worse-case outcomes):

- Portfolio A (No Asia) has a projected median portfolio value of $1,652 million, compared to $1,690 million for Portfolio B (With Asia), an increase in real return from approximately 5% to 5.3% annually over 10 years. *This higher projected median value for Portfolio B (With Asia) indicates a higher expected return from the allocation, all else being equal—consistent with expectations of a return premium for Asia ex-Japan equities.*
- Portfolio A (No Asia) also has a lower projected downside portfolio value (5th percentile) of $1,071 million, compared to $1,085 million for Portfolio B (With Asia). *This increase in projected downside portfolio value from Portfolio A to B indicates a less severe worse-case scenario given the Asia allocation, all else being equal.*

This may appear surprising given our higher volatility assumption for Asia. However, due to a “de-coupling” from the West that many Asian economies are experiencing, low correlation acts to cushion large negative returns in developed markets, smoothing volatility and increasing overall portfolio returns.

The net effect, as we transition from Portfolio A to B, is higher projected median values and higher downside portfolio values—an indication that the aggregate portfolio effect is to increase expected return while also improving the worse-case portfolio outcome, based on our long-term capital market assumptions.

---

23 To obtain a probability from a percentile, simply subtract the percentile from 100%. For example, a 95th percentile value indicates a (100%–95%) or 5% probability of occurrence.

24 Annualized volatility of approximately 25% for Asia ex-Japan vs approximately 15% for domestic and international developed equity. See JPMorgan Asset Management long-term capital market assumptions, Appendix D.
Portfolio analysis: Risks along the way

While Portfolio B (With Asia) may provide an improved worse-case outcome ten years out, the East Asian financial crisis in 1997 is a reminder that investors do need to consider the issue of short-term risk.

A relevant question is: Are market drawdowns as severe as those experienced by investors during the East Asian financial crisis likely to be repeated?25

Before addressing this question, we need to more completely capture three aspects of short-term market risk:

1. Markets frequently display more extreme (positive and negative) returns than one “normally” expects.26

2. Periods of high volatility in the markets tend to be followed by successive periods of high volatility, while periods of low volatility tend to be followed by successive periods of low volatility.

3. Low-return environments tend to couple with higher-volatility environments (partially due to a leveraging effect on company balance sheets induced by falling stock prices), while high-return environments tend to couple with low-volatility environments.

We enhance our model simulations27 for Asia to account for these non-normal effects.28 Ten years of forward-looking monthly return projections from our enhanced Asian model are shown in Exhibit 18.29

Even after accounting for these non-normal effects, our forward-looking projections suggest significantly lower maximum drawdowns over

---

We expect any future market drawdowns to be less severe than those experienced during the Asian financial crisis.

Exhibit 18: Simulated returns for Asian equity show periods of volatility clustering, extreme monthly returns and the impact of leveraging effect

Source: JPMorgan Asset Management. Based on monthly data over the ten-year period ending 9/30/07. Note: A comparison with similar monthly projections from our U.S. model shows the range of monthly returns going from -14.3% to 9.9%, with similar periods of volatility clustering, extreme monthly returns and the impact of leveraging effects.

---

25 We define maximum drawdown as the cumulative loss from a market peak to the following trough.
26 Based on a normal distribution.
27 We apply Nelson’s (1991) Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model, except that our error terms follow a normal (rather than generalized error) distribution. For further details on the specification, please refer to Appendix B.
28 Non-normal effects are defined as higher probability of extreme events, negative skew in returns and leverage effects as a result of regimes of high volatility/low returns followed by regimes of low volatility/high returns.
29 Note the overall expected return and risk of the asset class is similar under both models. In other words, the first two moments of the distribution are preserved, which is important for comparative purposes.
the next ten years than those experienced by investors during the East Asian financial crisis.

Spurred by the collapse of the Thai baht, the East Asian financial crisis in 1997 saw a maximum drawdown in the Asian equity market of 58% from July 1997 to August 1998. Our forward-looking projections, from November 2007 to September 2017, forecast a maximum drawdown of 32% in Asia.

Why do we forecast lower drawdown risk going forward?

There were at least two reasons why the Asian financial crisis had as severe an impact as it did: overvalued currencies and unsustainable levels of external debt (in addition to structurally weak financial institutions). This led to a pronounced contagion which affected nearly every economy in the region. However, given the significant progress Asia has made since 1997, we do not expect the impact of future market turmoil to be as severe as it was during the crisis. In particular:

- Total foreign exchange reserves of five large Asian economies increased by a factor of four over 1997 to 2006 (to nearly US$1.5 trillion).
- Net external debt, as percentage of GDP, for five of the largest Asian economies has declined from 44% at the end of 1997 to 29% at the end of 2005. This has improved the financial strength and resilience of these economies to better weather economic downturns (without going bankrupt as was the case in 1997).

In summary, although our longer-term Monte Carlo simulations (discussed earlier) show Portfolio B becoming more efficient via an explicit overweight allocation to Asia, our more granular monthly simulations do illustrate intra-periods of higher volatility. However, projections from our enhanced model indicate significantly lower maximum drawdowns than those experienced by investors during the East Asian financial crisis in 1997. With this in mind, we are able to better appreciate the shorter-term risks of Asian equity as an investment proposition, while weighing these against the longer-term returns.

Overweighting Asia is a strategic imperative—not a tactical play

The continued progress of Asian economies (particularly China and India) toward higher productivity is the linchpin of our strategic case for overweighting Asia ex-Japan equities.

The results of our portfolio analysis affirm the long-term case. On an aggregate basis, higher allocations to Asia ex-Japan equities should increase portfolio efficiency, resulting in higher long-term potential returns with less severe downside results. There are short-term trade-offs, as these markets will continue to exhibit high levels of volatility, though we do not expect future drawdowns to be of the severity seen during the Asian financial crisis of 1997.

We believe our main thesis holds. If one believes the case for higher valuations based on productivity growth (which we argue is quantitatively and qualitatively sound), then overweighting Asia is a strategic imperative. The potential gain in portfolio efficiency from such an overweight, over long periods of time, is so pronounced that it appears to be a reliable means of improving portfolio outcomes on the downside, while increasing returns.

---

10 Based on monthly data on MSCI US$ Asia ex Japan Index sourced from Datastream.
11 The five economies are China, India, Thailand, Indonesia and Malaysia—data sourced from World Development Indicators (WDI).
12 Improved reserve levels allow central banks to defend against speculative attacks on their currencies. High reserves also act as a buffer against credit market dislocations.
PRIVATE EQUITY IN ASIA
STRONG PRODUCTIVITY-DRIVEN GROWTH, MANAGER SELECTION WILL BE KEY

We have thus far outlined a strong quantitative case for increasing valuations in Asia ex-Japan equities, based on a productivity-driven new economic regime.

Investors would be right to wonder how far these productivity-driven gains might extend. Do they extend, for example, to private equity?

This is a fitting question, as the region is a magnet for private equity and venture capital investing, with a compound annual growth of 90% in fund raising over the last four years. China now ranks third for private equity investment (behind the U.K. and the U.S.) with $20.5 billion of capital under management in 2007. Indian private equity investments amounted to $15.5 billion in 2007.

We believe the answer is “yes.”

In this section, we discuss the various drivers of private equity growth and how they contribute to a conducive investing environment in Asia. We also demonstrate, through empirical modeling, how productivity can drive overall growth in private equity markets.

The question for investors remains one of how to capture returns in this space. We believe that while overall private equity markets should see significant growth, manager selection will be critical to accessing the right opportunities, and hence the potential for high returns.

Productive entrepreneurship: A key driver of private equity growth

An environment conducive to productive entrepreneurship that is focused on profit seeking, rational risk taking, and wealth creation is both a key driver and a necessary prerequisite for successful private equity investing. Without adequate mechanisms for assessing risk, generating profits, and retaining wealth, private equity cannot flourish as an asset class. (The opposite, unproductive entrepreneurship, is characterized by less efficient practices leading to, in many cases, “wealth destruction.” Examples of unproductive entrepreneurship include lobbying, corruption and formation of illegal entities.)

How can we capture the effects of productive entrepreneurship in Asia? This is clearly a challenging exercise, given the lack of history and quality data sources.

In practice, we do know that productive entrepreneurship is spurred by innovation, and innovation is closely tied to protecting intellectual property through the filing of patents. A cursory look at the number of patent applications filed in five large Asian economies shows a steep incline of 125% from 1996 to 2004.

We offer this data point with caution: In Asia, R&D spending is relatively low compared to the United States and “innovation” has been supplemented with “adoption” of technology developed

---

33 Asia ex-Japan. Source: EMPEA estimates, 02/29/08.
34 “Private Equity Going Public,” Global Private Equity Report 2006, PricewaterhouseCoopers LLP.
36 We define productive (unproductive) entrepreneurship as activities that contribute (detract) to (from) economic growth.
37 Innovation in this context refers to new ideas or technology that have a tangible, positive impact on established existing practices and output.
38 World Development indicators (WDI) database. Percentage represents a simple average of increase in total number of resident and non-resident patent applications from 1996 to 2004 in China, India, Singapore, Indonesia and South Korea.
elsewhere, particularly in the West. 39 Given this emphasis on “adoption,” as well as historically weak intellectual property protections, the number of patent applications is an imperfect proxy for productive entrepreneurship. 40

It is, however, the only viable proxy available. We believe it does illustrate an upward trend in a key driver of private equity markets, namely, the proliferation of the “ideas” market.

Other key drivers: Productivity, financial market development, and capital inflow

In our previous discussion, we identified both productivity and a “financing boom” as key drivers of both rising equity valuations and overall economic expansion. By “financing boom” we mean both deeper, more liquid markets and higher capital flows toward entrepreneurial investment. We see all of these factors playing a role in the development of private equity markets in Asia:

• **Productivity growth:** Higher productivity is the result of increased levels of output per worker, by both private and public market entities. And in the seven Asian countries on which our analysis focuses (China, India, Singapore, South Korea, Thailand, Indonesia, and Malaysia), real GDP per worker increased by 23% over the ten-year period ending in 2004. 41

Not only does private equity investment contribute to such increased efficiency of capital and labor, higher productivity can positively influence the value of private equity firms. The first-order influence is through higher profit margins. The implicit assumption here is that higher productivity translates to higher income, improving the value of assets and the ability to realize gains through asset sales or to expand organically or through mergers and acquisitions.

• **Financial market development and deepening:** A well-capitalized public equity market has an overriding positive influence on the development of private equity markets. 42 We see significant evidence of capital market development and deepening in our seven Asia ex-Japan economies, where capitalization growth (as a percent of GDP) has been, on average, 48% over the ten years from 1995 to 2004. 41

The first-order effect of a deep, liquid public equity market is to enhance exit opportunities (i.e., IPOs). The availability and visibility of exit options also tangibly encourages more private equity investing, i.e., there exists a two-way feedback mechanism.

• **Capital inflow (government, private and foreign):** The most immediate way in which capital inflow impacts private equity activity is through the funding of entrepreneurship, which is the target opportunity set for private equity investors.

Capital flow can take place from a variety of sources, one such source being foreign investors seeking high-return investments. By one measure, that of foreign direct investment (FDI), we see that Asia is in the midst of a capital investment boom. FDI as a percentage of GDP has doubled, on average, in our seven Asian economies over the ten-year period ending 2004. 41

We also see domestic drivers of private capital investment, with several Asian governments being keen financiers of private equity. For example, in 2007, 24% of the private funds launched in China were government sponsored. 43

---

39 As per WDI database, R&D expenditures over 2004 as % of GDP for East Asia & Pacific was 1.5%, compared to 2.7% for the United States.

40 Interestingly, our proxy for entrepreneurship is “insignificant” when tested for an impact on private equity markets in Asia ex-Japan. We believe the driver of this insignificance is the focus on adoption by many private equity entrepreneurs in Asia ex-Japan.

41 WDI database.

42 This has empirically been shown to be the case for many developed economies. Black and Gilson (1997) use Japan, Germany and the United States as case studies to illustrate the impact of public equity market development on venture capital markets.

43 Asia Private Equity Review (June 2008).
Empirical modeling: Gauging the potential impact on private equity growth

The confluence of positive influences in Asia for private equity is striking, and we believe they set the stage for significant growth. In this section, we test the impact of our various drivers in an empirical setting.

Our analysis uses a dynamic panel model that includes our seven countries in Asia ex-Japan.45 In addition to a cross-sectional country component, our panel also exploits a time dimension and reduces the reliance on any one specific country or time period to sway our results or inferences. Hence, we believe the conclusions are more robust than if we simply employed single country models.

Given that many of the drivers and influences we discuss are not directly measurable, we developed a system of proxies, set out in Exhibit 19. We believe that each proxy has a high degree of correlation with the area we are trying to assess.

Exhibit 19: Areas of influence, and their empirical proxies

<table>
<thead>
<tr>
<th>Area</th>
<th>Proxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private equity market growth</td>
<td>Value of private equity deals (% of GDP)44 [Dependent variable]</td>
</tr>
<tr>
<td>Productive entrepreneurship</td>
<td>Total patent applications from residents and non-residents</td>
</tr>
<tr>
<td>Productivity growth</td>
<td>Real GDP per worker</td>
</tr>
<tr>
<td>Financial market development</td>
<td>Market capitalization of listed companies (% of GDP)</td>
</tr>
<tr>
<td>Capital inflows</td>
<td>Foreign direct investments, net inflows (% of GDP)</td>
</tr>
</tbody>
</table>

Source: JPMorgan Asset Management, WDI, Venture Economics.
Note: The quality of data for total patent applications in Indonesia and Malaysia is not as high as the other countries. We employ linear interpolation where there are missing values for intermittent years. To extrapolate missing values, we use the average growth rate implied by the data we do have.

Exhibit 20: Productivity is a key driver of private equity growth in Asia

<table>
<thead>
<tr>
<th>Driver</th>
<th>Expected sign of influence</th>
<th>Actual sign of influence</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive entrepreneurship</td>
<td>Positive</td>
<td>Positive</td>
<td>Not significant</td>
</tr>
<tr>
<td>Productivity growth</td>
<td>Positive</td>
<td>Strongly positive</td>
<td>Very significant</td>
</tr>
<tr>
<td>Financial market development</td>
<td>Positive</td>
<td>Positive</td>
<td>Very significant</td>
</tr>
<tr>
<td>Capital inflows</td>
<td>Positive</td>
<td>Positive</td>
<td>Very significant</td>
</tr>
</tbody>
</table>

Sources: JPMorgan Asset Management analysis, based on data from WDI, Venture Economics, covering the period 1990–2005.

44 The data on private equity deals is biased in two ways due to the fact that it is driven by individual surveys sent by Venture Economics (VE) to private equity firms. Firstly, VE has limited coverage in Asia ex-Japan. Secondly, that coverage has been rising. This creates an issue as changes in private equity deal flow from one year to the next may not represent higher market activity in isolation, but also a higher response rate and/or increased coverage by VE. Despite these caveats, we forged ahead with our analysis to see if the data available contradicted or re-affirmed our convictions, as set out in the previous section.

45 We apply Generalized Method of Moments on an unbalanced (16 x 7) panel using orthogonal deviations to remove for cross-section fixed effects using white standard errors and co-variances.
The most important result, however, from the perspective of our investment thesis, is that productivity growth is very significant in explaining private equity market development.

And while this result is in line with our expectations, both the size and magnitude of the coefficient help us answer our original question: Is higher productivity a key driving force in private equity market growth?

Our answer is an emphatic “Yes.”

Investing in Asia: The private equity opportunity set

Now that we have established an explicit, positive link between productivity growth and the expansion of private equity markets in Asia, we turn to the question of how private equity investors might capture returns in this space.

First, one has to acknowledge that, unlike public equity markets, where passive strategies can replicate broad market returns, it is not possible to invest passively in private equity. Private equity is, by definition, actively managed. Hence, realized returns from private equity allocations are very sensitive to idiosyncratic manager risk. Selecting the right manager is critical.

And private equity managers in Asia have been generating impressive returns. As Exhibit 21 points out, private equity funds invested in Asia have consistently returned a premium compared to their U.S. counterparts, across a spectrum of vintage years.46

(We need to be cautious about the extent of our inferences here: past performance is not indicative of future performance; the data is subject to upward survivorship and reporting bias; and there is tremendous heterogeneity across both prior time periods and the universe of private equity funds.)

Caveats notwithstanding, the results form a good reference point for a discussion of private equity opportunities in Asia, which are somewhat different than those in the developed world.

Western private equity funds are generally divided into four categories: venture capital, buy-outs, special situation, and merchant banking funds.47

In Asia, the opportunity set is a bit different — with fund categories reflecting both the region’s rapid economic expansion and focus on productivity growth.48 The main private equity opportunities in Asia can be categorized as follows:

1. Start-up and high-tech funds (these are most similar to traditional venture capital type providers). For example, India’s IT sector forms a core target for these funds, which have seen

---

46 Vintage year is a term used to specify the year when a private equity firm starts making investments. It is significant because this is when a firm essentially draws capital and enters the market. The actual vintage year does significantly affect the internal rate of return a private equity fund ultimately delivers and therefore, should be considered when comparing internal rates of return (IRRs). Most obviously, a vintage year that coincides with a market peak should result in higher expected returns on the rationale that the fund buys into firms when future earnings are overvalued (and vice versa for a market trough). In other words, because of a higher commitment of initial capital, the required return is also higher during market peaks (and vice versa for troughs).

47 Venture capital and buy-out funds tend to dominate the industry in terms of total capital dedicated as well as amount of research produced.

considerable foreign capital inflows over the last few years.49

2. Corporate restructuring funds (characterized by investments in more established, expansion oriented enterprises). Activity in this area has increased, most notably following the Asian financial crisis in 1997, which increased the availability of target firms.

3. Infrastructure funds with a focus on projects like bridges, docks, and highways. Large bureaucratic governments have aligned their interests with the private sector in enhancing public infrastructure. This has been done, for example, through legislative changes, direct funding, and other forms of public-private partnerships.

4. Privatization funds that exploit opportunities created by governments’ increasing attention to privatization. Inherently, the opportunity here involves improving efficiency of state enterprises.

Capturing returns from these unique opportunities will entail selecting the right manager. However, private equity manager selection in Asia is complicated by a number of factors.

Unlike many Western private equity fund managers, few Asian private equity managers have sufficient track records to display consistently good performance over extended periods of time. In addition, given the developing nature of the financial services industry, as well as the evolving legal and regulatory environment in Asia, a robust due diligence process is very important.

One potential pitfall is to select managers based on their ability to gather assets (often seen in Asia as a testament to a manager’s potential investment skill). This can result in downside surprises to the investor if other aspects of the manager’s skill set are not considered—such as:

- Access to local liquidity (in entering and exiting investments)
- Nimbleness to deploy capital quickly to short-lived opportunities, and
- Ability to deal effectively with government red tape.

In particular, given the relatively small deal size of potential private equity opportunities in Asia (compared to the West), the risk of too much capital chasing too few opportunities also needs to be adequately addressed.

Avoiding these specific pitfalls, in addition to others associated with private equity manager selection in general, will be critical to realizing the high return potential that the growth of Asia’s private equity market presents.

---

Manager selection is key to capturing returns in Asia’s growing private equity market

---

49 According to data from Venture Economics (VE), the value (in U.S. dollars) of venture capital type deals in India’s IT sector rose by 32% over 2007. This represented 21% of total activity, by value, in India’s venture capital market over 2007.
This page intentionally left blank.
Infrastructure investment provides another opportunity for foreign investors to participate in Asia’s projected strong growth.

But just as with equities, relying on a “growth” justification for infrastructure investment, while seemingly compelling on the surface, is not in itself adequate. And just as with equities, we need to investigate whether economic growth is truly driving infrastructure development, or whether infrastructure development also contributes to economic growth.

The latter case is actually just as compelling a thesis.

Consider: If economic growth is leading infrastructure development, then those returns will ebb and flow with economic cycles. But if the relationship also works the other way around—with infrastructure driving productivity and economic growth—then there is potential for that growth to ultimately feed back into higher demand for infrastructure investment.

To make the case, we address the following two components of the argument:

1. The “institutional” environment is conducive to investment and the generation of infrastructure over time.
2. There is a causal link from infrastructure investment to productivity and economic growth and a feedback mechanism is in play.

Separately, we also show that the impact of higher Asian productivity growth on infrastructure investments is positive in the long run.

**Asia primes the pump: A new institutional environment promotes infrastructure investment**

Investment in public infrastructure has long been considered central to economic expansion.

Infrastructure investment can be a positive input in the production process, raising efficiency and productivity of the private sector, increasing the distribution potential of output, and ultimately leading to higher living standards. At the same time, productivity can enhance returns to infrastructure and, through this channel, overall long-run economic growth.

This is generally true for a country at any stage of its development. The impact of the U.S. economic expansion during the late 1990s, which we have referred to as the “Golden Age,” is one such example.

In emerging economies, however, infrastructure investment has not always contributed to growth. For decades, funding came in large part through foreign loans that added to debt burdens or unilateral capital transfers (e.g., development grants) that raised aggregate consumption and were immediately absorbed by the economy. Neither of these factors contributed much to growth or productivity.

Now, however, many Asian countries are actively managing their infrastructure investment programs with the explicit intent of enhancing productivity and growth. There are
The key mechanisms at work driving wealth creation for private investors and higher productivity for these economies:

1. Public licensing, regulatory and other support policies offer incentives to private firms to become “common carriers” that serve industry and the population at large.

2. Government co-investment offers potential benefits to private investors in the form of reduced cost and greater participation in large-scale projects that would otherwise not have been possible.

3. Targeted capital allocations with explicit investment risk guidelines offer greater overall efficiency and enable new projects to better achieve their stated goals. A particular aspect of this type of capital flow is that it arrives with pre-conditions, such as limited government involvement, and higher levels of due diligence.

These features are indicative of a new “institutional environment” in Asia, one that provides an incentive structure of interest to both public and private participants. It also provides the basic framework of a feedback mechanism, one that enhances investment returns through higher rates of productivity, which then drive economic growth and more demand for infrastructure.

Setting up the model: A feedback relationship from infrastructure to growth, incorporating productivity

To test the validity of our thesis of infrastructure driving productivity and economic growth, we first need to model the structural relationship between infrastructure, productivity and aggregate economic growth.

Our model is based on economic theory, which suggests infrastructure investment should:

- Increase the marginal product of capital used in production, i.e., for each unit of private sector capital, the production frontier should be higher.

- Prevent, or at least slow down, diminishing returns as users of infrastructure scale up, i.e., as a firm expands, the output should not decline for each additional unit of labor employed. This concept builds on the fact that, without infrastructure investment, the production function for a firm can hit a bottleneck: after some point, it will be able to produce incrementally less for each additional unit of input.

- Enhance the rate of economic growth across a wide range of factors driving economic expansion.

We present the finer details of our model in Appendix C.

The model highlights a feedback relationship without pinpointing which factor is leading the other. Moreover, it leads us to a possible solution in which infrastructure impacts final economic output directly as a factor of production, and also has a secondary impact on other physical capital stock.

Our model also takes into consideration factors correlated with growth, i.e., productivity. Finally, it explicitly allows for short-term dynamics that investors often observe from a long-run relationship between economic output and infrastructure capital.
Drawing out the empirical evidence: How infrastructure enhances and benefits from productivity and growth

Solving our model will allow us to disentangle the driving mechanisms and assess quantitatively the role that infrastructure development plays in enhancing productivity and growth.

However, to solve our model, empirical evidence is required. This is bound to be a challenge, given the lack of data in general, and more specifically, the lack of historical data. Ultimately, we focus our analysis on railroad construction in India and China, as a proxy for infrastructure development.

Unlike the case for smaller Asian economies, rail has been a vital transportation provider and a significant component of the infrastructure link for both China and India. Using this data as a proxy for infrastructure development, we try to assess, at an aggregate level, the dynamics among productivity, economic output, and infrastructure development.

To estimate the model, we employed vector error correction techniques, including three variables: 1) kilometers of rail lines as a proxy for infrastructure development, 2) real gross domestic product per person, and 3) productivity, defined as real gross domestic product per worker.

The estimated output of this model, reported in Exhibit 22, describes the causal chain linking these three aggregate factors together.

The results confirm our thesis of infrastructure development driving productivity and GDP growth in Asia.

For China, we find that over the long run each factor is related to each of the others in a three-way feedback relationship. In other words, there exists a cycle whereby higher infrastructure development leads to higher levels of productivity and economic growth, which leads to still higher levels of infrastructure development.

For India, the link exists. However, it is short-term in nature and runs from infrastructure to productivity and economic growth.

---

Data on railroad construction from WDI. Railroad construction is an imperfect proxy for infrastructure, as it does not capture the complete characteristics of the asset class. Other forms of infrastructure include bridges, roads, power stations, airports, harbors and pipelines. However, inadequate data does not permit us to incorporate these in our analysis.
To provide an assessment of how higher productivity in Asia impacts the behavior of infrastructure, we employed methods similar to those we used in gauging the impact of productivity shocks on P/E ratios. In particular, we assessed within our model whether the impact of a one standard deviation positive shock to productivity leads to temporary or permanent increases in infrastructure development over a ten-year period.

Exhibit 23 shows our results.

Our evidence for China and India points to a permanent impact where a positive shock to productivity results in elevated levels of infrastructure development at the end of ten years, compared to pre-shock levels.

Overall, our results suggest that not only does infrastructure investment improve productivity and GDP growth, the feedback mechanism produces a cycle whereby there is potential for that growth to ultimately feed back into higher demand for infrastructure investment. Finally, higher productivity in Asia should translate to increased infrastructure development over the long run.

The implications of our findings for investors are broad. Investment in the infrastructure sector should lead to surprises in the growth profile of the economy and generate favorable spillovers to other sectors. This includes the resource sector, which produces inputs to infrastructure, the services sector, which supports these industries, and also greater internal mobility to facilitate trade through the growth of transport links.

While our analysis focuses on China and India, we believe the conclusions apply across Asia. As such, rapid infrastructure development in Asia should favorably impact a range of other asset classes, including public equity, private equity and commodities.

CONCLUSION

BASED ON A PRODUCTIVITY THESIS, INVESTORS SHOULD CONSIDER A STRATEGIC OVERWEIGHT TO ASIA

As mentioned at the very beginning, the investment case we make for Asia is unique, and though it has many moving parts, there is one central theme: productivity.

It is increasing productivity that should spark investors’ interest in the Asia ex-Japan region, not simply the region’s economic growth rate. As we have shown, the benefits of overall economic growth do not automatically flow to shareholders, and over the long term, the correlation between growth and equity returns is actually negative. So while Asia’s GDP growth trend may continue, we believe that, on its own, it is insufficient as an investment thesis to support a long-term strategic commitment to the region.

The long-term equity story is based on productivity.

We believe that the real story lies in Asia’s rising productivity. When productivity growth is a main driver of economic growth, then shareholders are much more likely to benefit through rising P/E ratios and valuations. In this paper, we have demonstrated a direct relationship between productivity growth and P/E growth, in which productivity is causative and its effects are permanent.

The region’s continued productivity growth, supported by sustained public and private investment, should drive a long-term upward revaluation trend for Asian equities—presenting a strategic imperative for investors.

A similar story applies to private equity and infrastructure.

In addition, we demonstrated that productivity can drive strong growth in the private equity and infrastructure markets. Both of these asset classes serve to enhance productivity gains as well as benefit from them. And we believe these assets—with an opportunity set unique to Asia—present another potential high-return opportunity for foreign investors, albeit with caveats, such as the continuing need for careful manager selection and due diligence.

The implication for investors: rewards outweigh risks in a strategic overweight to Asia.

Throughout the paper we note caveats (e.g., lack of complete data) as well as cautions (e.g., short-term volatility). Yet, none of these obviates the evidence we present concerning the strong, long-term fundamental driver of potential returns: rising productivity.

We have shown that the region’s strong economic updraft in productivity, financial market growth, and capital inflows (as well as productive entrepreneurship) has the potential to support long-term growth in public equity valuations, as well as in private equity markets and infrastructure returns. And the key driver in this scenario is productivity, which we have shown to have causal link to all three.
In making this case—methodically and quantitatively—we hope to supply investors with a clear, compelling thesis for allocating funds to Asia. It is a thesis that runs counter to conventional wisdom, but has solid analytics on its side. It is also strong enough to supplant piecemeal, tactical approaches that may have sufficed in the past, but fail at identifying the true driver of valuation growth and returns in Asia.

And now that we have identified the key driver of potential investment returns, we believe that Asia must be seen in a somewhat different light: not as a tactical, regional, growth, or diversification play, but as a strategic opportunity deserving of a dedicated allocation based on its fundamental merits.

We hope that this paper will spark discussion and debate, as well as a comprehensive reevaluation of Asia as a strategic investment priority and we welcome your comments and feedback.
ADDENDA

ADDENDUM A
Minding the speed-bumps: Assessing the risks to China’s economy

Because China plays such a central role in Asia’s growth, and is such a key destination for foreign capital, it is worth taking a moment to review some of the potential risks to China’s economy. First, we consider three economic risks that appear pressing, given current global trends. Valuable insight into these risks can be gained from econometric analysis, which we offer in this section:

1. The risk that a slowdown in the developed world would negatively impact China,
2. The risk posed by domestic inflationary pressures, and
3. The risk posed by commodity price inflation.

In addition, we summarize four policy-related risks that are less open to quantitative analysis, yet are still important to China’s overall economic outlook: exchange rates, political stability, energy and protectionism. We present our view of these risks, and their potential impact, in summary form at the end of this section.

Economic slowdown in the developed world: Has “decoupling” reduced the risk for China?

How vulnerable would China be to an economic slowdown in the developed world? To reach a potential answer, we construct a simple macro-econometric model that includes a range of variables for China (i.e., index of industrial production, rate of inflation, government expenditure, exchange rate, broad money supply) as well as a proxy for global income (G7 industrial production). The data set starts in 1980 and ends in 2007.

Using a vector error correction (VEC) model we assess to what extent one variable may react to a shock in the other. In this instance, we explicitly impose a negative one-standard deviation shock to the global growth rate and observe its impact on China’s growth. The response of China’s industrial production growth is traced out in Exhibit A-1. The path shows that after an immediate decline in output growth, the decline in growth is reversed within two years following the initial impact of the shock.

While a slowdown in the United States, depending on its severity, will no doubt negatively impact China’s growth rate, the effect is likely to be transitory. China’s transition to a consumption-based, domestic demand-oriented economy is diminishing U.S. influence. In fact, though the issue of “decoupling” is still hotly debated, the entire region appears to be undergoing a significant shift away from dependence on the United States. As a recent article in The Economist52 points out:

- China’s growth in exports to the United States slowed to only 5% (in U.S. dollar terms) from January 2007 to January 2008, but exports to Brazil, India and Russia were up by more than 60%; half of China’s exports now go to other emerging economies.

---

• Emerging markets collectively send more than half their total exports to other emerging markets. As a group they now export more to China than to the U.S.

• The four biggest emerging economies, which accounted for two-fifths of global GDP growth in 2007, are the least dependent on the United States: exports to the United States account for just 8% of China’s GDP, 4% of India’s, 3% of Brazil’s, and 1% of Russia’s.

• Trade surpluses have allowed emerging markets to build up $3.2 trillion in foreign exchange reserves ($2.1 trillion excluding China), which provides a strong buffer against any credit market disruptions in the developed world.

Assuming that emerging market fundamentals can remain relatively insulated from developed world credit troubles, trade between emerging nations will flourish and demand for commodities will remain high. Taken altogether, this should mean that in the event of a U.S. recession or sustained slowdown, China should be able to weather any repercussive impact.

Does domestic inflation pose a serious threat to China’s growth path?

Recent signs of inflationary pressure have fuelled concerns about its potential impact on China’s growth. Until recently, China experienced a remarkable period of relative price stability, but inflationary pressure is being induced by two main catalysts:

1. Enormous injections of liquidity caused by the accumulation of foreign exchange reserves and
2. The growth of inflationary expectations (i.e., if people expect rising inflationary pressure, they will start building this into anticipations of future price increases, fueling an inflationary cycle).

To explore this issue we went back to our model and imposed a single, standard deviation one-time inflationary shock (using CPI as a proxy).

Results indicate that although the response is lagged (see Exhibit A-2), the hike in inflation recedes within the first 24 months, and growth rebounds and stabilizes by the third year. According to our model, inflation’s long-term impact on growth appears to be negative, but only marginally.

Temporary spikes in inflation are likely to persist in China, led by food prices, as we saw this year. But the real question is whether we are at the brink of a regime for inflationary acceleration. If that be the case, the People’s Bank of China (PBOC) will no doubt have a new set of challenges of in terms of whether to curb the inflationary tide through tighter monetary control or risk a broader monetary correction.

Implications of further escalation in commodity price inflation

The other inflationary pressure in China is rising commodity prices. Given China’s dominant role in commodity markets, sharp commodity price increases (since mid-2003) have raised concerns about whether these increases are a precursor to higher consumer price inflation in China.53

Exhibit A-2: Higher domestic inflation has a slightly negative impact on Chinese growth over the long-run

Standard deviation (%) — Industrial production

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.010</td>
</tr>
<tr>
<td>1</td>
<td>-0.005</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.005</td>
</tr>
<tr>
<td>4</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>-0.005</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0.005</td>
</tr>
<tr>
<td>8</td>
<td>0.010</td>
</tr>
<tr>
<td>9</td>
<td>-0.005</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>


53 Based on empirical results by Joanne Cutler, Carrie Chan and Unias Li (2005) “The Relationship Between Commodity and Consumer Prices in Mainland China and Hong Kong,” Hong Kong Monetary Authority Quarterly Bulletin, suggested that changes in non-fuel commodity prices have significant predictive power for headline CPI inflation for Mainland China and Hong Kong, while changes in energy prices are not significant. For Mainland China, the relationship between changes in commodity and consumer prices has been unstable over the past two decades, reflecting structural changes in the economy and the difficulty in controlling for changes in monetary conditions over the period. Shortening the sample period to post-1997, a 1% rise in non-fuel commodity prices is associated with a 0.4 to 0.5 percentage-point increase in future CPI inflation. These estimates are larger relative to those found in other studies on developed economies, which could be due to several factors, including openness, a relatively large share of food prices in the CPI, and, for the Mainland, the size and commodity intensity of its manufacturing sector.
To assess China’s vulnerability to a commodity price shock, we added the Goldman Sachs Commodity Index (GSCI) as a variable in our model, and then imposed a single standard-deviation shock to the GSCI. The results in Exhibit A-3 show that inflation increases and dips slightly between years 1 and 3. However, from that period on, inflation remains at an elevated level.

This result supports our view of the decoupling debate, implying that both decoupling and globalization can take place simultaneously as China’s dependence on commodities demonstrates. Notably, as China continues towards a consumer and domestic demand-driven economy, its engine of growth depends on commodity imports, and commodity prices should have an impact on domestic inflation.

In fact, slower U.S. growth may mitigate price pressures from commodities and actually provide a favorable growth environment for China.

### Exhibit A-3: Higher commodity prices should have a persistent impact on Chinese inflation

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.002</td>
</tr>
<tr>
<td>1</td>
<td>-0.001</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.002</td>
</tr>
</tbody>
</table>


Summary evaluation of policy-related risks for the China investor

**Exchange Rate Appreciation:** Currency appreciation is likely to follow a gradual path. Significant trade-weighted appreciation of the currency would have a favorable impact on China’s terms of trade, giving China’s economy room for domestic easing. Currency adjustment will slowly take on a more dominant role in monetary tightening if the scope of interest rate changes becomes limited.

**Political Change:** China has a unique political system, hence comparative analysis is limited. China continues its strategic focus on “building comprehensive national power” with a strong emphasis on economic development. China has become more active at deploying its economic and political capital to influence strategy both regionally and globally. Despite domestic political protests (relating to labor and property rights, reforms, and forced relocations), we believe that political power in China will stay firmly in place. But at the same time, politicians should be flexible and pragmatic enough to maintain policies that place a priority on macroeconomic stability.

**Energy Consumption:** As energy consumption significantly exceeds energy production, China relies heavily on imported energy sources. While energy consumption is expected to grow, its rate of growth is expected to slow due to structural changes in the economy, i.e., a stable long-run economic growth-rate path and a move towards stimulating the service industries.

Despite the dependence on foreign sources, energy intensity (measured by the ratio of energy consumed to real GDP) has decreased since 1978. The recent five-year plan has set targets to achieve energy conservation and ensure energy security. These measures serve to encourage the use of fuel-efficient vehicles, increase costs of heavy energy-intensive manufacturing and temper China’s rapidly increasing demand for oil. Together, they help the economy move to a more sustainable energy policy.

**U.S. Protectionism:** One of the biggest risks to global economic growth is protectionism. However, in the United States, it is still not certain exactly what form this could take. It is however clear that the main focus of any new trade barriers would be China. The most obvious risk is new anti-dumping and countervailing duties but there could be other complaints relating to Chinese practices. The ultimate enforcement mechanism is tariffs, which could potentially be bad for growth assets (including U.S. equities) as well as for bonds. However, we feel the risk of this is low as the likelihood of an appreciating Chinese currency will keep protectionist sentiments at bay. CNY (yuan-dollar) movement is at the pinnacle of this issue since it is seen as a cornerstone in U.S. Treasury Secretary Henry Paulson’s non-confrontational and holistic approach to U.S.-China economic relations.

Source: JPMorgan Asset Management
ADDENDUM B
Asia’s frontier markets: Opportunities for strategic investors

A discussion of emerging Asia would not be complete without covering the newest additions to the investible universe, which are termed “frontier markets.” In addition to the IFC’s long-standing Frontier Market Index, recently MSCI Barra introduced the MSCI Frontier Market Index which is “designed to track a range of equity markets more accessible to global investors.”

Frontier stock markets are not mature by any means, but their economies are growing rapidly, attracting a robust inflow of foreign capital, and have a relatively young and inexpensive labor force. Asia includes two of these markets: Sri Lanka and Vietnam, and Central Asia includes, amongst others, Kazakhstan. Another emerging frontier market, which is likely to make an entrance, is Bangladesh.

These and other frontier markets are characterized by the following:

- They should allow openness to foreign investment
- They are not already considered within a developed stock market universe
- They typically exist in economies that are undergoing relatively stable economic, financial, political and/or institutional development.

In this section we explore three strong indicators of opportunity in frontier markets: their low correlations with developed markets; the non-normality of return distributions; and the prevalence of idiosyncratic market risk.

This assessment is meant to provide a broad overview of the risk/return characteristics of these markets. It sets out some key fundamentals that should pique investors’ interest in the potential long-term portfolio benefits of adding exposure to frontier markets.

Frontier markets’ low correlation with the U.S. market

Frontier markets exhibit a low correlation with the U.S. market—at the individual country level. As shown in Exhibit B-1, the correlation of returns between the IFC Frontier Market Index and the MSCI U.S. Index has only averaged around 30% for the past five years. And the majority of the IFC’s constituent markets have a correlation of less than 20%. Furthermore, there is a low level (approximately 5%) of U.S. participation and ownership in these markets.

Exhibit B-1: U.S. ownership and correlation with frontier markets: Accommodative signals for strategic investors


54 The International Finance Corporation (IFC) is part of the World Bank Group.
55 The same statistics for emerging markets are a correlation of approximately 60%, and ownership of just over 50%.
Non-normality of return distribution

In Exhibit B-2 we show density plots for our four frontier markets, compared with the standard normal distribution. Generally, the plots are more peaked and have fatter tails than the normal distribution—conclusively rejecting the hypothesis of normality for each market.

What are the insights for investors? The magnitude of non-normality (in particular, the fat right tails) suggests that there may be interesting opportunities for investors to access abnormal returns. And as these markets liberalize, their attributes are likely to get closer to those generally considered to be characteristic of the emerging markets.

Our remarks should be balanced with the fact that these markets do suffer from liquidity issues. As these markets liberalize and investors, foreign and local, acquire access to them, liquidity is expected to become less of an impediment over time.
The prevalence of idiosyncratic risk

A natural question also arises as to the risk characteristics of frontier markets: How much risk is due to systemic (or broad market) factors, and how much is due to idiosyncratic or individual market-specific factors?\(^{56}\)

To gain a better understanding, we built a two-variable vector error correction model for each frontier market—which allows us to establish a long-run relationship between world market and local market returns. We then apply an exogenous one-time shock to the entire system and measure future variance (volatility) of the local market; our goal is to see how much of its variance is the result of world market (systemic) influence, versus local market (idiosyncratic) influence.

Results of this decomposition are presented in Exhibit B-3. On average, 95% of the shock variance is explained by local market (idiosyncratic) factors. While this is an expected result, the extent of idiosyncratic dominance is in many ways startling.

Looking farther afield, toward the new frontiers of investing

In conclusion, as correlations between U.S. and international markets move toward a stronger alignment, investors need to look further afield to find investments that offer greater return enhancement potential, and new opportunities for diversification.

We point in this note to the attraction of frontier markets, and especially those in Asia. Frontier markets tend to be smaller, less liquid and convey a lower GDP per capita than established emerging markets. But their fundamental appeal is growing, in terms of financial, economic, and political development.

We believe that, taken all together, these factors should prompt strategic investors to give consideration to participating in what will certainly be the emerging markets of the near future.

---

\(^{56}\) For an empirical analysis of world market volatility linkages and the measurement of systematic versus idiosyncratic risk over time across major developed markets, see:

APPENDIX A: Testing for cointegration and estimation of a vector error correction model

We employ a simple multivariate vector error correction model to estimate the system variables using a structural system. As techniques oriented towards testing for a long-run or cointegrating relationship, and the Granger non-causality using a vector autoregressive model is standard, we only highlight our approach briefly.

Consider a vector error correction framework for a set of $k$ variables, and at most $r$ long-run or cointegrating relationships, with a binding constraint such that $0 \leq r \leq k - 1$. This forms the basis of a $k$-dimensional vector autoregression given by:

$$z_t = A_1 z_{t-1} + \ldots + A_m z_{t-m} + \mu + \xi_t$$

where $m$ is the lag length, $\mu$ is a set of deterministic components and $\xi_t$ is a set of white-noise error terms.

If we reparameterize, we can respiece this system as a VECM by:

$$\Delta z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \ldots + \Pi z_{t-k+1} + \mu + \xi_t$$

Testing for cointegration amounts to testing the following hypothesis:

$$H_1(r) : \Pi = \alpha \beta'$$

where $\Pi$ is $p \times p$, and $\alpha$ and $\beta$ are matrices of full rank, of dimension $p \times r$. Hence, the hypothesis is one of reduced rank for $\Pi$. If $r$ is greater than one, as in the case of multivariate systems, there will emerge an identity issue. For details, see Johansen (1991), Wickens (1996), Pesaran, Shin and Smith (2001).

APPENDIX B: Exponential generalized autoregressive conditional heteroskedasticity

Autoregressive Conditional Heteroskedasticity (ARCH) models are specifically designed to model and forecast conditional variances. The variance of the dependent variable is modeled as a function of past values of the dependent variable and independent, or exogenous variables.

The EGARCH or Exponential GARCH model was proposed by Nelson (1991). Our specification for returns and conditional variance is as follows:

$$Y_t = X_t' \theta + \epsilon_t$$

$$\log(\sigma_t^2) = \psi + \sum_{j=1}^{q} \beta_j \log(\sigma_t) + \sum_{i=1}^{p} \alpha_i \frac{\epsilon_{t-i}}{\sigma_{t-i}} - \frac{\epsilon_{t-i}}{\sigma_{t-i}} + \sum_{k=1}^{r} \gamma_k \frac{\epsilon_{t-k}}{\sigma_{t-k}}$$

---

While Nelson assumes that the $e_t$ follows a Generalized Error Distribution (GED), we assume a standard normal distribution. We estimate parameters using the method of maximum likelihood. For more detail, refer to Nelson (1991).58

APPENDIX C:
Developing a structural model for infrastructure return determination

The first step in developing the model to link infrastructure to economic output is to identify the determinants of the factor accumulation rate, and hence the income growth rate.59 So let us define the production function of the aggregate economy and how this maps to factors: labor ($L$), infrastructure assets ($N$), non-infrastructure capital ($K$) and total factor productivity ($P$).

$$Y = K^\alpha N^\beta (PL)^{1-\alpha-\beta}$$

where $\alpha$ and $\beta$ are both strictly positive parameters. Transforming this model to its logarithmic form, and then its first-difference growth form yields:

$$\varphi_y = (1 - \alpha - \beta) \varphi_p + \alpha \varphi_k + \beta \varphi_n$$

where $\varphi_p$ is the growth rate of total factor productivity ($P$), and $\varphi_y$ is the growth rate of output per-capita i.e., $y = Y/L$; $\varphi_k$ is the growth rate of non-infrastructure capital per-capita i.e., $k = K/L$; $\varphi_n$ is the growth rate of non-infrastructure capital per-capita i.e., $n = N/L$. This specification raises two separate problems, the first relating to potential endogeneity, and the second that non-infrastructure capital is very difficult to estimate.

These problems can be partially addressed by developing a simultaneous equation structural model based on the short term dynamics of the economy to its long-run equilibrium. If we represent $\nabla$ as the growth rate of labor $L$, and $\delta$ as the depreciation rate, this model can be described as:

$$\varphi_k = s_k \nabla k - \delta - \nabla$$
$$\varphi_n = s_n \nabla n - \delta - \nabla$$

where $s_k$ and $s_n$ are shares of output allocated to the accumulation of capital and infrastructure.

This represents a simultaneous equation model, where one unit of output, capital and infrastructure are accumulated according to these relationships.

The salient characteristics and outputs of the model are summarized below:

- Using this model, we identify the determinants of factor accumulation, and hence economic growth, by way of an aggregate production function for the entire economy. We do so by focusing on four main factors: labor, infrastructure capital, non-infrastructure capital, and total factor productivity. (It is important to note that we treat these as broad categories, i.e., any other potential factors would be treated as components of one of these broader categories.)

- We also distinguish infrastructure assets from other types of capital because they are prone to government regulation and intervention, and therefore have a unique significance within a portfolio. (However, we also recognize that non-infrastructure capital is problematic to measure and poses potential for omitted factor bias.)

- We assume that production in infrastructure is highly capital intensive—although within the model this can be made flexible, especially if we apply it to developing countries such as China and India, which would have a higher share of labor as an input to overall production.

- We also assume that governments may play an oversight role from an administration and monitoring perspective, even though the entire investment may be funded privately.


APPENDIX D: Capital market assumptions underlying portfolio projections

Our framework for analyzing portfolios relies on three key assumptions regarding future behavior of the Asian equity markets, namely, expected return, volatility, and correlations.60 Our assumptions (for a U.S.-domiciled investor) over ten years for Asia are as follows:

- **Expected compound real return of** 7.25% per year
- **Volatility of** 25.2% per year
- **Correlations with U.S. and International developed equity of** 0.64 and 0.68, respectively61

Our forward looking real return assumption is based on the principles of the Capital Asset Pricing Model. We estimate an Equity Risk Premium (ERP) assumption for developed and developing markets, taking into account history and an expected differential based on fundamental and valuation drivers of equity markets. In particular, our ERP assumptions for U.S., International and Asia are 3.5%, 4.25% and 5.25% per year, respectively, over U.S. Treasuries.

In developing volatility and correlation assumptions for the future, we rely on the behavior of asset classes over recent history and our judgment as to what we consider reasonable. In particular, our calculation period includes a segment of the East Asian financial crisis, which we previously elaborated on, so we feel comfortable that we have captured potential correlation effects associated with periods of financial distress. We believe that history—over representative periods of time—provides a good starting point to draw inferences regarding future volatility and correlations of an asset class.

---

60 Volatility is defined as the annual standard deviation of returns.
61 Correlations above ±0.5 can be considered significant.
JPMorgan long-term capital market return assumptions

<table>
<thead>
<tr>
<th>Asset Class</th>
<th>Expected 10–15 year annualized compound returns*</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. ECONOMIC INDICATORS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Inflation</td>
<td>2.50%</td>
<td>Central Bank discipline to keep inflation well-contained. Headline inflation to converge toward core over the long-term.</td>
</tr>
<tr>
<td>U.S. Real GDP</td>
<td>3.00</td>
<td>Productivity growth to stay firm at around 2% as companies keep costs in check. Labor force to grow at around 1%.</td>
</tr>
<tr>
<td><strong>FIXED INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Cash</td>
<td>4.50%</td>
<td>Tough inflation stance by policymakers to require real interest rates of around 2%.</td>
</tr>
<tr>
<td>U.S. 10-yr Treasury</td>
<td>6.50</td>
<td>10-yr yields to rise toward an equilibrium of 5.25%, well up from current levels. The resulting capital loss to reduce total return.</td>
</tr>
<tr>
<td>U.S. TIPS</td>
<td>4.50</td>
<td>Current breakeven rates broadly in line with long-term inflation forecast. Low, stable inflation to keep total returns in line with Treasuries.</td>
</tr>
<tr>
<td>U.S. Aggregate</td>
<td>5.25</td>
<td>Current yields below fair value, largely due to lower risk free rates. Moderate yield increase to 5.5% equilibrium to trim total returns.</td>
</tr>
<tr>
<td>U.S. Long Duration Govt./Corp</td>
<td>5.50</td>
<td>Current yields below fair value, largely due to lower risk free rates. Moderate yield increase to 6.0% equilibrium to trim total returns.</td>
</tr>
<tr>
<td>U.S. Municipal</td>
<td>4.00</td>
<td>Less refunding supply to result in average equilibrium yield multiple of 0.80x equivalent maturity Treasury.</td>
</tr>
<tr>
<td>U.S. High Yield</td>
<td>7.50</td>
<td>Recent market turbulence has pushed yields above assumed long-term equilibrium. Spread tightening from current levels to boost total return. Haircut to returns from expected defaults.</td>
</tr>
<tr>
<td>Non-U.S. World Govt. Bond Index (local)</td>
<td>3.50</td>
<td>Government bond yields to rise globally from current levels leading to reater term capital losses. Relatively flat curves limit coupon return.</td>
</tr>
<tr>
<td>Non-U.S. World Govt. Bond Index (USD)</td>
<td>4.75</td>
<td>Dollar depreciation against the major constituent currencies of the WGBI expected to boost returns to U.S. investors.</td>
</tr>
<tr>
<td><strong>EQUITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Large Cap</td>
<td>8.00</td>
<td>Historically low spreads to be maintained given improved creditworthiness.</td>
</tr>
<tr>
<td>U.S. Large Cap EPS Growth</td>
<td>6.60</td>
<td>Sum of below building blocks (Nominal EPS Growth + Dividend Yield + P/E return impact).</td>
</tr>
<tr>
<td>U.S. Large Cap Dividend Yield</td>
<td>2.00</td>
<td>Slight premium to nominal GDP reflects corporate spending discipline, lower payout ratios and boost from overseas revenues.</td>
</tr>
<tr>
<td>U.S. Large Cap P/E Return Impact</td>
<td>0.00</td>
<td>Moderate increase in payouts, constrained by likely higher tax rate on dividends.</td>
</tr>
<tr>
<td>U.S. Mid Cap</td>
<td>8.25</td>
<td>Long standing valuation drag removed given that multiples have contracted to around historical averages.</td>
</tr>
<tr>
<td>U.S. Small Cap</td>
<td>8.25</td>
<td>Moderate premium to large cap assumed for both. Small cap stocks relatively expensive by historical comparison and not expected to deliver material return advantage over mid cap.</td>
</tr>
<tr>
<td>U.S. Large Cap Growth</td>
<td>7.75</td>
<td>Value expected to outperform growth over time. Lower difference than historically given stretched valuations on value stocks.</td>
</tr>
<tr>
<td>U.S. Large Cap Value</td>
<td>8.25</td>
<td>Moderate premium to large cap assumed for both. Small cap stocks relatively expensive by historical comparison and not expected to deliver material return advantage over mid cap.</td>
</tr>
<tr>
<td>U.S. High Yield</td>
<td>7.50</td>
<td>Corporate discipline to support EAFE return on equity. Valuation convergence a headwind for (japanese equities.</td>
</tr>
<tr>
<td>EAFE (local)</td>
<td>8.75</td>
<td>Dollar depreciation against the major constituent currencies of the EAFE index to boost returns to U.S. investors.</td>
</tr>
<tr>
<td>EAFE (USD)</td>
<td>8.75</td>
<td>Dollar depreciation against the major constituent currencies of the EAFE index to boost returns to U.S. investors.</td>
</tr>
<tr>
<td>Asia ex Japan (USD)</td>
<td>9.75</td>
<td>Rapid economic and profit growth along with currency appreciation likely to see Asia benefit relative to other regions.</td>
</tr>
<tr>
<td>Emerging Market Equity (USD)</td>
<td>9.50</td>
<td>Premium over developed markets maintained. Unchanged sovereign risk, earnings and currency strength supportive. Valuations likely to be challenged.</td>
</tr>
<tr>
<td><strong>ALTERNATIVE ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. REITS*</td>
<td>7.00%</td>
<td>REIT return below public equity, especially given stretched valuations, but long-term advantage over direct real estate assumed given leveraged capital appreciation.</td>
</tr>
<tr>
<td>U.S. Direct Real Estate (unlevered)</td>
<td>6.75</td>
<td>Returns expected to be between equity and fixed income.</td>
</tr>
<tr>
<td>Hedge Fund – Directional*</td>
<td>8.00</td>
<td>Directional returns to match public equity but with lower volatility. Non-directional returns increased in line with public markets. Sizeable divergence between managers expected (see below). Fund of funds an equal weighted average of directional and non-directional.**</td>
</tr>
<tr>
<td>Hedge Fund – Arbitrage (non-directional)*</td>
<td>6.50</td>
<td>方向性リターンを公的株式に合わせて設定し、より低い推移性を持つ。非方向性リターンは、公的株式の動きに追従。管理者間での収益差は大きい。Fund of Fundsは、方向性と非方向性の平均。</td>
</tr>
<tr>
<td>Hedge Fund – Fund of Funds</td>
<td>7.25</td>
<td></td>
</tr>
<tr>
<td>Private Equity†</td>
<td>9.00</td>
<td>Moderate premium to public markets assumed. Sizeable divergence expected across private investments (see below)*.</td>
</tr>
</tbody>
</table>

Note: Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all the above asset classes. Please note that all information shown is based on qualitative analysis. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or as a promise of future performance. Note that these asset class assumptions are passive only—they do not consider the impact of active management. Return estimates are on a compound or internal rate of return (IRR) basis. Equivalent arithmetic averages, as well as further information, are shown overleaf.

* All asset class assumptions are in total return terms.

** Private Equity, Hedge Funds and Direct Real Estate are unlike other asset classes shown above in that there is no underlying investible index. Exchange traded funds may be used to gain exposure to REITs.

† The return estimates shown for these assets are our estimates of industry medians—the dispersion of returns among managers in these asset classes is typically far wider than in traditional assets.
### JPMorgan long-term capital market return assumptions (continued)

#### Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Inflation</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Cash</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. TIPS</td>
<td>0.94</td>
<td>0.94</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Aggregate</td>
<td>0.95</td>
<td>0.95</td>
<td>0.94</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 10-Year Treasury</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td>0.95</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Large Cap</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.94</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Small Cap</td>
<td>0.90</td>
<td>0.90</td>
<td>0.93</td>
<td>0.91</td>
<td>0.93</td>
<td>0.95</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Large Cap Growth</td>
<td>0.82</td>
<td>0.82</td>
<td>0.82</td>
<td>0.82</td>
<td>0.83</td>
<td>0.83</td>
<td>0.83</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging Markets</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging Markets - U.S. (hedged)</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerging Markets - U.S. (unhedged)</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>0.81</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### (continued from previous page)

Expected returns employ proprietary projections of the “equilibrium” returns of each asset class (as well as equilibrium estimates of their future volatility). We estimate the “equilibrium” performance of an asset class or strategy by analyzing current economic and market conditions and historical market trends. Equilibrium estimates represent our projection of the central tendency (going out over a very long time period) around which market returns may fluctuate, because they reflect what we believe is the value inherent in each market. It is possible that actual returns will vary considerably from this equilibrium, even for a number of years. References to future returns for either asset allocation strategies or asset classes are not promises or even estimates of actual returns a client portfolio may achieve.

Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only, and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

JPMorgan Asset Management is the marketing name for the asset management businesses of JPMorgan Chase & Co. Those businesses included, but are not limited to, J.P. Morgan Investment Management Inc., JPMorgan Investment Advisors Inc., Security Capital Research & Management Inc. and J.P. Morgan Alternative Asset Management Inc.
Bibliography


Cutler, Joanne, Carrie Chan and Unias Li (2005), “The Relationship Between Commodity and Consumer Prices in Mainland China and Hong Kong,” *Hong Kong Monetary Authority (HKMA)*, Working Papers.


*Harvard Business Publishing*.


Analysis of Level Relationships,” *Journal of Applied Econometrics* special issue in honour of J. D. Sargan on
the theme “Studies in Empirical Macroeconometrics,” (eds) D.F. Hendry and M.H. Pesaran, Vol.16,
pp. 289–326.

pp. 489–503.


Acknowledgements

A wide group of colleagues at JPMorgan Asset Management has meaningfully contributed to the formation and content of this paper. We would particularly like to thank John Garibaldi who had the original vision and encouraged the widest possible discussion of Asia as a strategic investment theme. A number of people, too many to list, provided constructive criticism and editorial comment. Stu Schweitzer, John Garibaldi, Jason Ciaglo, and Serkan Bahceci acted as key reviewers. Meena Arora, Joe Azelby, Peter Ball, Sherene Ban, John Baumann, Matt Chilewich, John Ide, Jeff Geller, Eve Guernsey, Philip Jackson, Piers Litherland, Martin Porter, Kathy Rosa, David Shairp, Richard Titherington, Larry Unrein, CS Venkatakrishnan, Subu Venkataraman, Jean Walshe and Bob White shared valuable insights and provided thoughtful comments. Barbara Heubel and her immaculate team of editors, in particular Martin Luz, and graphics professionals, especially Sean Coleman and Rachel Liu, contributed important improvements to the language, layout and presentation of the content. Finally, Susan Oh provided critical encouragement, invaluable advice and persistent support. The quality of this paper and the discussion benefited tremendously from this group's help. Special thanks go to Karin Franceries who devoted much time and effort in providing constructive criticism and feedback over several iterations, which proved imperative to the overall construct of the paper. Of course, any errors and/or omissions are the sole responsibility of the authors.
IMPORTANT DISCLAIMER

This material contains certain projections and assumptions with regard to the opportunities described therein. This material must not be relied upon as advice or interpreted as a recommendation by JPMorgan Asset Management that the opportunities are a suitable investment for any recipient of this information.

Investors may experience results that differ materially from any information shown. The return on the opportunities will depend on the actual investments made and the economic, interest rate and regulatory environment during the relevant period.

Infrastructure investments may be subject to risks including, but not limited to, declines in the value of real estate, risks related to general and economic conditions, changes in the value of the underlying property owned by the trust and defaults by borrowers.

Investing in foreign countries is heightened when investing in emerging markets. In addition, the small size of securities markets and the low trading volume may lead to a lack of liquidity, which leads to increased volatility. Also, emerging markets may not provide adequate legal protection for private or foreign investment or private property.

Please note that investments in non-U.S. markets are subject to special currency, political, and economic risks. Exchange rates may cause the value of underlying overseas investments to go down or up. Investments in certain markets may be more volatile than other markets and the risk to your capital is therefore greater. Also, the economic and political situations may be more volatile than in established economies and these may adversely influence the value of the investments made.

JPMorgan Asset Management does not make any express or implied representation or warranty as to the accuracy or completeness of the information contained herein, and expressly disclaims any and all liability that may be based upon or relate to such information, or any errors therein or omissions there from. This material must not be relied upon by you in making a decision as to whether to invest in the opportunities described herein. Prospective investors should conduct their own investigation and analysis (including, without limitation, their consideration and review of the analyses referred to herein) and make an assessment of the opportunity independently and without reliance on this material or JPMorgan Asset Management.

In addition, prospective investors are strongly urged to consult their own legal counsel and financial, accounting, regulatory and tax advisers regarding the implications for them of investing in these opportunities.

JPMorgan Asset Management is the marketing name for the asset management businesses of JPMorgan Chase & Co. Those businesses include, but are not limited to, J.P. Morgan Investment Management Inc., JPMorgan Investment Advisors Inc., Security Capital Research & Management Incorporated and J.P. Morgan Alternative Asset Management, Inc.

© JPMorgan Chase & Co. May 2008