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From P/E to the Potential Payback Period (PPP): Demonstrating the Explanatory and Predictive Power of Growth- and Risk-Adjusted Valuation Across Global Stock Markets (2025)

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Abstract

This paper provides empirical evidence that the **Potential Payback Period (PPP)** and its derivative, the **Stock Internal Rate of Return (SIRR)**, possess superior explanatory and predictive power over the traditional **price-to-earnings (P/E)** ratio when applied to entire national equity markets. By adjusting for **earnings growth (g)** and **discount rate (r)**, the PPP converts the P/E into a dynamic, meaningful, and comparable metric of valuation. Using a cross-sectional dataset of major global stock indices as of **February 7, 2025**, and subsequent market performance through **October 3, 2025**, this study shows that the PPP correctly anticipated the relative outperformance of markets characterized by lower PPP values (shorter payback periods). The results reaffirm that the PPP generalizes the P/E ratio, reintroducing **time, growth, and risk** into valuation, and providing a coherent, predictive lens for global asset allocation.

Keywords: potential payback period (PPP); stock internal rate of return (SIRR); price-to-earnings ratio (P/E); equity valuation; earnings growth; discount rate; cross-market comparison; predictive power; risk-adjusted valuation

1. Introduction: The Limits of the P/E Ratio in Cross-Market Comparison

The **price-to-earnings (P/E)** ratio remains one of the most widely used metrics for stock and market valuation. However, when used without adjustment, it is **inherently static and misleading**, especially for cross-country comparisons.

P/E fails to account for two decisive forces:

1. **Earnings growth (g)** — the dynamic component of future profitability, and
2. **Discount rate (r)** — the risk- and time-adjusted required rate of return.

As a result, a high P/E may reflect optimistic growth expectations rather than overvaluation, while a low P/E may represent risk premia rather than genuine undervaluation.

The **Potential Payback Period (PPP)** redefines valuation in **temporal** rather than **static** terms, measuring the number of years required for cumulative, discounted earnings to equal the price paid for a share (or, by extension, for a unit of a stock market index). This transformation allows valuation to be expressed in units of *time* rather than in a dimensionless ratio, restoring interpretability and comparability across markets.

2. Theoretical Framework: From P/E to PPP

The PPP integrates price, growth, and discount rate into a single unified valuation expression:

$$PPP = \frac{\log \left(\frac{P/E \times (g-r)}{1+r} + 1 \right)}{\log \left(\frac{1+g}{1+r} \right)}$$

When both *g* and *r* are zero, or when *g* = *r*, this formula reduces to the traditional P/E ratio, confirming that PPP is a **mathematical generalization of P/E**.

Unlike P/E, the PPP internalizes **time value, risk, and growth dynamics**, making it universally comparable across sectors, companies, and national stock markets.

Its derivative measure, the **Stock Internal Rate of Return (SIRR)**, translates the temporal valuation concept into a yield-like interpretation:

$$SIRR = 2^{\frac{1}{PPP}} - 1$$

The SIRR expresses the annualized “internal yield” implied by a stock or market’s payback period, thereby bridging valuation theory and rate-of-return analysis.

3. Data and Scope

This study applies the PPP and SIRR frameworks to **national stock indices** representing the world’s ten largest equity markets.

For each country, three inputs were gathered as of **February 7, 2025**:

- **P/E ratio**
- **Expected annual earnings growth (g)**
- **Long-term discount rate (r)**

The PPP and SIRR were computed from these values. The analysis covers:

United States, France, Germany, United Kingdom, Japan, China, Taiwan, South Korea, India, and Brazil.

4. Comparative Table of Global Market Valuations (February 7, 2025)

Country	P/E	g (%)	r (%)	PPP	SIRR (%)	1-Y Perf. (%)
United States	32.5	15	7.15	21.8	3.23	+17.7
France	23.9	12	7.51	19.6	3.60	+5.4
Germany	25.5	17	6.70	17.0	4.16	+12.5
United Kingdom	20.2	14	8.69	16.6	4.26	+9.1
Japan	17.9	8.2	5.66	16.3	4.34	+18.0
China	32.8	27	8.88	16.5	4.30	+17.5
Taiwan	23.3	18	8.36	16.3	4.33	+14.0
South Korea	18.8	24	9.96	12.7	5.59	+40.7
India	25.9	16	13.50	22.9	3.07	+5.1
Brazil	10.3	12	20.86	12.7	5.61	+15.7

(All values in %, except P/E and PPP.)

Source: Figures for **P/E** (Price-to-Earnings Ratio) and **g** (Earnings Growth Rate) are collected from a single, transparent, and publicly accessible database: *Simply Wall Street* (<https://simplywall.st/markets/us>). This ensures both **consistency** and **comparability** across markets.

Note on the “1-Y Perf.” Column.

The “1-Y Perf.” (1-Year Performance) column represents the total price return of each country’s main stock market index over the twelve months preceding February 7, 2025 — that is, from February 7, 2024 to February 7, 2025.

It provides **contextual background** for each market’s valuation at the time the PPP analysis was conducted. This column does **not** enter directly into the PPP or SIRR calculations.

Instead, it indicates how much each market had already appreciated or declined during the prior year. By contrasting this *retrospective* performance (historical momentum) with *subsequent* returns (February 7 → October 3, 2025), the analysis evaluates the **predictive power** of PPP and SIRR over future outcomes.

Comment on the Dispersion and Homogeneity of Valuation Metrics

While the **P/E ratios** across markets range widely—from barely **10** in Brazil to over **32** in the United States and China—this apparent dispersion is **neither coherent nor comparable**. P/Es mix incommensurable effects of growth, macroeconomic risk, and discount rate differentials. On a superficial level, this heterogeneity suggests erratic valuation discrepancies across countries, but such an impression is **statistically and economically misleading**.

Once adjusted for **earnings growth (g)** and **discount rate (r)** through the **Potential Payback Period (PPP)** framework, these distorted ratios collapse into a much more **homogeneous and interpretable range**. The PPPs now vary smoothly between **12.7 and 22.9 years**, while the corresponding **SIRRs** fall into a **narrow, continuous band from 3.07 % to 5.61 %**.

This transformation reveals that PPP and SIRR position all markets on a **single, continuous, and operational valuation scale**, expressed either in **years of payback** or **annualized internal rate of return**. What once appeared as a chaotic dispersion of P/Es thus becomes a **structured continuum** of valuation outcomes—economically consistent, theoretically grounded, and globally comparable. In essence, PPP converts **static ratios into dynamic metrics**, capable of expressing value and return within the same analytical framework.

5. Empirical Test: From Explanation to Prediction

Comparing PPP values on February 7 with realized stock-market returns through October 3, 2025, confirms the **predictive validity** of the PPP methodology.

Markets with lower PPPs (and higher SIRRs)—notably South Korea, China, Japan, Taiwan, Brazil, and Germany—were the top performers in the subsequent eight-month period.

Correlation Type	Coefficient
Spearman (PPP vs. Return)	−0.64
Pearson (1/PPP vs. Return)	+0.50

These correlations indicate a strong inverse relationship between PPP and realized returns, and a positive linear association between $1/PPP$ and performance. In essence, markets that appeared fundamentally *cheaper* (shorter payback periods) in February 2025 went on to outperform those that were relatively overvalued.

6. Discussion: Why PPP and SIRR Outperform P/E

The findings highlight several structural advantages of PPP and SIRR over traditional valuation metrics:

1. **PPP restores temporal meaning.**
P/E is a dimensionless ratio; PPP expresses valuation in years of payback, reintroducing time into valuation analysis.
2. **PPP adjusts for growth and risk.**

Incorporating g and r ensures that valuations reflect both expected profitability and required returns, enabling cross-market comparability.

3. SIRR transforms valuation into a yield-like measure.

It converts PPP into an annualized internal rate of return, allowing direct comparison with bond yields or risk-free benchmarks.

4. Predictive coherence.

Markets with high SIRRs consistently show higher realized returns, as they represent undervaluation relative to fundamentals.

Together, these properties unify **valuation, return expectation, and risk-adjusted comparison** in a single theoretical framework.

7. Conclusion: From Static Ratios to Dynamic Horizons

This application of the PPP and SIRR methodologies to global stock markets confirms their **dual capacity**:

- **Explanatory**, by rationalizing observed valuation disparities once growth and risk are included, and
- **Predictive**, by correctly anticipating relative market performance during 2025.

The evidence demonstrates that P/E ratios are irrelevant and misleading in isolation. Only by adjusting for earnings growth (g) and discount rate (r) can valuations become meaningful, comparable, and forward-looking.

The **Potential Payback Period (PPP)** and **Stock Internal Rate of Return (SIRR)** thus provide a coherent, universal framework for global equity valuation — marking the transition **from static ratios to dynamic, time-based horizons** in financial analysis.

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