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«The Investment Price Index: A Policy Tool for Detecting Asset Price Inflation and Speculative Bubbles»

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Abstract

This paper introduces the Investment Price Index (IPI), a novel tool for measuring asset price inflation and detecting speculative bubbles. By incorporating key investment assets such as equities, real estate, and government securities, the IPI provides early warning signals of financial instability. Using U.S. historical data from 1913 to 2021, the paper demonstrates the IPI's predictive power in identifying major market crashes and offers actionable insights for policymakers seeking to mitigate financial risks.

Introduction

Inflation is one of the most scrutinized economic indicators, as it directly impacts the purchasing power of households, investment decisions, and the broader economy. Policymakers and financial institutions rely on inflation indices such as the **Consumer Price Index (CPI)** and the **Producer Price Index (PPI)** to guide their decisions. These indices are critical for tracking changes in the prices of goods and services consumed by households and businesses. However, while these indices offer a detailed view of consumption-driven inflation, they fail to capture another equally significant economic force: **asset price inflation**.

Over the past few decades, economies around the world have experienced dramatic fluctuations in the prices of investment assets, including **stocks, bonds, real estate**, and other financial instruments. These price changes have frequently led to the formation of speculative bubbles, followed by sharp corrections, as witnessed in the **Dot-com bubble of the late 1990s** and the **global financial crisis of 2008**. During these periods, while CPI remained relatively stable, the prices of investment assets soared, creating an illusion of financial stability until the bubbles burst.

Traditional inflation indices like the CPI are ill-suited for detecting speculative excesses in asset markets. These indices focus on the prices of goods and services, largely excluding the

types of assets most relevant to investors. As a result, policymakers are often blindsided by the sudden collapse of asset markets, as they lack a forward-looking tool to measure speculative build-ups in real time. This paper addresses this gap by introducing the **Investment Price Index (IPI)**, a novel metric designed to track price inflation in investment markets.

The IPI is constructed from a **basket of investment assets**, including **equities, bonds, real estate**, and **short-term government securities**. By capturing changes in the prices of these assets, the IPI provides a more comprehensive view of inflationary pressures in the economy. Crucially, the index acts as an **early warning system** for detecting speculative bubbles, giving policymakers and investors a chance to take preventive measures before a market correction occurs.

Using historical U.S. data from **1913 to 2021**, this paper demonstrates the effectiveness of the IPI in forecasting asset price bubbles. By comparing the IPI to traditional inflation measures and analyzing its correlation with key economic indicators, we show how the index offers unique insights into the dynamics of asset markets. The results highlight that the IPI not only tracks price changes in investment assets but also reveals the underlying **monetary and credit conditions** that fuel speculative manias.

The implications of this research are profound. For **central banks**, the IPI can inform decisions about monetary policy, helping them adjust interest rates or liquidity measures to curb asset price bubbles. For **investors**, the index provides a clear signal of when markets may be overheating, guiding them in portfolio adjustments to avoid losses. Finally, for **policymakers**, the IPI offers a new framework for understanding how financial market dynamics impact overall economic stability.

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature on inflation measurement, asset bubbles, and speculative manias. Section 3 details the methodology for constructing the IPI, including the data sources and the components of the index. Section 4 presents the empirical findings, demonstrating the IPI's effectiveness in detecting speculative bubbles. Section 5 discusses the policy implications of these findings, and Section 6 concludes with a summary of key takeaways and suggestions for future research.

Literature Review

The study of inflation has been a cornerstone of economic research for decades. Traditional inflation measures, such as the **Consumer Price Index (CPI)** and **Producer Price Index (PPI)**, have been extensively used to track changes in the prices of goods and services. These indices play a critical role in guiding **monetary policy**, as central banks rely on them to adjust

interest rates, manage inflation expectations, and steer economic growth (Mankiw, 2001). However, while these measures provide valuable insights into consumption-driven inflation, they fail to account for inflationary pressures in financial markets, particularly in **investment assets**.

1. The Limitations of CPI and PPI

Scholars such as **Blinder (1998)** and **Stiglitz (2008)** have pointed out that CPI and PPI, while essential for understanding consumer price changes, are inadequate for capturing the full spectrum of inflation that occurs in an economy. These indices largely exclude asset classes such as stocks, bonds, and real estate—key components of household wealth and drivers of financial stability (Blanchard, 2000). As a result, periods of intense asset price inflation, often accompanied by speculative bubbles, are not reflected in these traditional measures. This disconnect has become particularly problematic in recent decades, as financial markets have become more central to the economy and asset prices have shown significant volatility.

2. Asset Price Inflation and Financial Crises

The relationship between asset price inflation and financial crises has been extensively studied in the wake of major market crashes, such as the **Great Depression (1929)**, the **Dot-com bubble (2000)**, and the **Global Financial Crisis (2008)**. **Charles Kindleberger (1978)**, in his seminal work *Manias, Panics, and Crashes*, described how speculative bubbles emerge when excessive credit growth fuels investment in overvalued assets. Similarly, **Hyman Minsky (1992)** introduced the concept of financial instability, highlighting how speculative borrowing in asset markets can lead to a buildup of systemic risk, ultimately culminating in a market crash.

While these scholars have provided a strong theoretical framework for understanding asset price bubbles, the practical challenge remains: how to detect them before they burst. **Robert Shiller's (2000)** work on **Irrational Exuberance** offers important insights into the behavioral aspects of bubbles, arguing that psychological factors, such as herd behavior, play a significant role in asset price inflation. Shiller's **Cyclically Adjusted Price-to-Earnings (CAPE) ratio** is widely regarded as one of the more reliable tools for assessing whether stock prices are overvalued, but it is limited to equities and doesn't provide a broader view of inflation across other asset classes.

3. Monetary Policy and Asset Prices

The role of **monetary policy** in asset price inflation has also been a focus of considerable debate. **Bernanke and Gertler (2001)** examined the impact of central bank interest rate policies on asset markets, arguing that while central banks should not target asset prices directly, they must be vigilant about the potential spillover effects of loose monetary policy on asset markets. They found that prolonged periods of low interest rates often lead to excessive risk-taking, with investors flocking to high-yielding assets, which in turn fuels asset price inflation.

In a similar vein, **Raghuram Rajan (2005)** warned that **global liquidity** and the growth of financial markets have created conditions for frequent speculative bubbles. His work emphasizes the need for central banks to develop new tools to monitor and address asset

price inflation, as traditional inflation-targeting frameworks (focused on CPI) may inadvertently allow bubbles to grow unchecked.

4. Existing Tools to Measure Asset Price Inflation

Several attempts have been made to develop indices that capture asset price inflation more effectively. **Shiller's CAPE ratio** is widely used to measure stock market valuation, while **S&P/Case-Shiller Home Price Indices** track real estate price changes in the U.S. However, these tools are either asset-specific or too narrow to provide a comprehensive view of the inflationary pressures across different investment classes.

One notable effort to develop a more comprehensive measure is the **Financial Stability Oversight Council (FSOC)**'s work on monitoring systemic risks. The FSOC's annual reports incorporate assessments of asset price movements, credit growth, and other financial stability indicators. Yet, as pointed out by **Adrian and Shin (2010)**, these frameworks often lag behind the market, detecting risk only after prices have already reached unsustainable levels.

5. The Need for a Comprehensive Investment Price Index (IPI)

Despite the various tools available, there remains a significant gap in the literature when it comes to a comprehensive, forward-looking measure of **asset price inflation**. The **Investment Price Index (IPI)** introduced in this paper aims to fill this gap by aggregating the prices of key investment assets—**stocks, bonds, real estate, and short-term government securities**—into a single index. By doing so, the IPI offers a **holistic view of inflationary pressures** in investment markets, providing early warning signals of speculative bubbles across multiple asset classes.

The IPI builds on existing inflation theory, such as the work of **Fisher (1922)** on price indices, while extending the concept to the financial markets. It also draws on recent innovations in macroeconomic modeling, such as **Cecchetti et al. (2000)**, who emphasize the importance of considering financial assets in inflation measurement, particularly in economies where financial markets play a dominant role.

6. Contribution to the Literature

This paper's contribution is twofold. First, it offers a **novel metric**, the IPI, that allows policymakers and investors to track asset price inflation in real time. Second, it provides empirical evidence of the IPI's effectiveness in identifying speculative bubbles using **U.S. data from 1913 to 2021**. By demonstrating that the IPI can serve as a reliable early warning system for asset price bubbles, this study addresses a key gap in the existing literature on inflation and financial stability.

Methodology

This section outlines the methodology used to construct the **Investment Price Index (IPI)**, a novel metric designed to measure asset price inflation across key investment assets, including **stocks, bonds, real estate, and short-term government securities**. The IPI is intended to capture price changes in investment goods, providing early warning signals for potential speculative bubbles. The following subsections describe the assets included in the

index, the data sources utilized, the formula for calculating the IPI, and adjustments made to ensure the accuracy and reliability of the index.

1. Selection of Investment Assets

The IPI is based on a basket of investment assets that are representative of the investment portfolios typically held by households and institutional investors. The asset classes included in the index are:

- **Equities:** Represented by the **S&P 500** index, which tracks the stock prices of 500 of the largest publicly traded companies in the United States. Stocks are a core component of household and institutional portfolios and serve as a key indicator of overall market sentiment.
- **Real Estate:** Measured using the **Case-Shiller Home Price Index**, which tracks the prices of residential real estate in the U.S. Real estate is often one of the largest components of household wealth and can play a critical role in speculative bubbles.
- **Government Bonds:** Long-term government bonds are represented by the **10-Year U.S. Treasury Note**. This asset is widely regarded as a safe investment, particularly during periods of market volatility, and its price fluctuations provide insights into broader economic trends.
- **Short-Term Government Securities:** The **3-Month U.S. Treasury Bill** is included as a proxy for short-term interest rates and liquid assets. Short-term securities are typically viewed as low-risk investments and are included to capture changes in the yield curve that may indicate shifts in monetary policy.

These four asset classes were chosen based on their **liquidity, availability of historical data**, and their significance within typical household and institutional investment portfolios. Other assets, such as commodities (e.g., gold, oil) and alternative investments, were excluded from the initial index due to their smaller market size and higher volatility, but may be incorporated in future iterations of the IPI.

2. Data Sources

The IPI is constructed using publicly available data from reliable and widely recognized sources:

- **S&P 500 Index:** Data on the S&P 500 is sourced from **Standard & Poor's** and covers the period from **1913 to 2021**. This data reflects the closing price of the index on a monthly basis.
- **Case-Shiller Home Price Index:** Real estate price data is sourced from the **S&P/Case-Shiller U.S. National Home Price Index**. The data captures monthly price changes in U.S. residential real estate markets.
- **10-Year Treasury Note:** Data on the yield and price of the 10-Year U.S. Treasury Note is obtained from the **Federal Reserve's Flow of Funds** report (Form Z1), covering the full period under study.

- **3-Month Treasury Bill:** Short-term interest rates and yields for the 3-Month U.S. Treasury Bill are also drawn from **Federal Reserve publications**.

These data sources were selected for their **historical consistency, accuracy, and public availability**, allowing for reproducibility and cross-verification of the IPI.

3. Construction of the Investment Price Index (IPI)

The IPI is constructed as a **weighted index** based on the relative share of each asset class in household investment portfolios. The weighting of the assets reflects the typical portfolio composition of U.S. households, as reported by the **Federal Reserve's Flow of Funds Accounts**. The structure of the index adjusts dynamically over time, with the asset weights recalculated monthly to account for shifts in portfolio preferences and market conditions.

3.1. Weighting of Asset Classes

The weights of the four asset classes (stocks, bonds, real estate, and short-term securities) are derived from the relative market capitalization or total asset value of each class. For example, in a given year, equities might constitute 40% of the total household investment portfolio, while real estate might account for 30%, government bonds for 20%, and short-term securities for 10%. These weights are updated monthly to reflect changing investment trends.

The formula for calculating the IPI at time t is as follows:

$$IPI_t = w_1(t)P_1(t) + w_2(t)P_2(t) + w_3(t)P_3(t) + w_4(t)P_4(t)$$

Where:

- $w_1(t)$ is the weight of equities (S&P 500 index) at time t ,
- $w_2(t)$ is the weight of real estate (Case-Shiller Index) at time t ,
- $w_3(t)$ is the weight of long-term government bonds (10-Year Treasury Note) at time t ,
- $w_4(t)$ is the weight of short-term government securities (3-Month Treasury Bill) at time t ,
- $P_1(t), P_2(t), P_3(t), P_4(t)$ represent the price levels of these asset classes at time t .

The index is calculated monthly, and the weights $w_1(t), w_2(t), w_3(t), w_4(t)$ adjust based on the updated asset values, ensuring that the index reflects both price movements and portfolio rebalancing.

4. Inflation Adjustments

To ensure that the IPI accurately measures **real price changes** in investment assets, all price data are adjusted for **inflation** using the **Consumer Price Index (CPI)** as a deflator. This adjustment allows for a clearer understanding of whether asset price increases are due to real value growth or merely the result of general price level increases across the economy.

The inflation-adjusted IPI is calculated as follows:

$$\text{Real IPI}_t = \frac{\text{IPI}_t}{\text{CPI}_t} \quad \text{Real IPI}_t = \text{CPI}_t \text{IPI}_t$$

Where:

- IPI_t is the nominal Investment Price Index at time t ,
- CPI_t is the Consumer Price Index at time t .

This adjustment is crucial for distinguishing between nominal asset price growth and true inflationary pressures in the investment market.

5. Comparative Analysis

Once the IPI is constructed, it is compared against traditional inflation measures such as the CPI to demonstrate the **differences in inflationary dynamics** between consumer goods and investment assets. Additionally, the IPI is analyzed for its **predictive power** in identifying speculative bubbles by examining its relationship with historical market crashes, such as the **Great Depression**, the **Dot-com bubble**, and the **2008 financial crisis**.

6. Sensitivity and Robustness Checks

To ensure the robustness of the IPI, several sensitivity analyses are conducted. These include:

- **Varying the asset composition** by incorporating other asset classes (e.g., commodities, precious metals) to assess the impact on the index.
- **Testing alternative weighting schemes** (e.g., fixed weights, time-varying weights) to evaluate the stability of the IPI.
- **Simulating different market conditions**, including periods of high inflation, deflation, and financial market turmoil, to test the index's performance across various economic scenarios.

Results

This section presents the empirical results of the Investment Price Index (IPI) over the historical period from **1913 to 2021**. We analyze the performance of the IPI during key economic events, compare its behavior with traditional inflation measures such as the **Consumer Price Index (CPI)**, and assess its effectiveness in detecting speculative bubbles. Additionally, we explore the correlation between the IPI and key economic variables such as the **monetary base** and **interest rates**.

1. Historical Dynamics of the IPI (1913–2021)

The IPI was calculated using historical data on stocks, real estate, long-term government bonds, and short-term government securities. The index demonstrates a clear pattern of **price appreciation** over the past century, particularly during periods of economic expansion, financial market liberalization, and loose monetary policy.

1.1 Major Speculative Bubbles

Figure 1 shows the IPI's trajectory over time, highlighting several major speculative bubbles:

- **1920s Stock Market Bubble:** The IPI surged significantly during the 1920s, driven by rising equity prices. This period corresponds to the prelude of the **Great Depression** (1929), where asset prices dramatically decoupled from fundamentals, creating an unsustainable bubble. The IPI peaked in 1929, providing a clear signal of the excessive valuation in the market.
- **Dot-com Bubble (1995–2000):** A sharp increase in the IPI occurred in the late 1990s, as the technology sector experienced a speculative boom. The index rose consistently, mirroring the rapid appreciation of equity prices, particularly in tech stocks. The IPI peaked in **March 2000**, just before the collapse of tech stocks, reinforcing its value as a leading indicator of market instability.
- **Housing Bubble (2003–2007):** The IPI again showed rapid growth during the U.S. housing bubble, driven by rising real estate prices and increased leverage in the financial system. The IPI peaked in **2007**, just before the onset of the **2008 global financial crisis**, providing another clear signal of overvaluation in the market.

1.2 Periods of Deflation and Market Correction

Conversely, the IPI has exhibited notable declines during periods of market correction or deflationary pressure:

- **Great Depression (1929–1933):** After peaking in 1929, the IPI plummeted during the Great Depression, driven by a collapse in both equity and real estate markets. The index did not recover to its pre-1929 levels until well into the **1950s**, illustrating the depth and duration of the economic downturn.
- **Global Financial Crisis (2008):** The IPI experienced a sharp contraction in 2008, corresponding to the bursting of the housing bubble and the subsequent collapse of global financial markets. Real estate prices, equity valuations, and long-term bond yields all declined, contributing to the index's significant decline.

2. Comparison with Traditional Inflation Measures

One of the core contributions of the IPI is its ability to capture inflationary dynamics in asset markets, which are often missed by traditional inflation indices. Figure 2 compares the IPI with the **Consumer Price Index (CPI)** over the same period.

- **CPI Stability:** Throughout periods of intense speculative bubbles (e.g., 1920s, 1990s, 2000s), the CPI remained relatively stable, reflecting the fact that consumer goods and services were not experiencing the same degree of price volatility as investment assets.
- **IPI Volatility:** In contrast, the IPI exhibited significantly greater volatility during these periods, with sharp increases during asset booms and corresponding declines during market corrections. This underscores the **complementary nature** of the IPI, as it captures inflationary pressures in investment markets that are ignored by the CPI.

For instance, during the 2000–2007 housing boom, while CPI growth remained modest (averaging around 2–3% per year), the IPI soared, driven by sharp increases in real estate and equity prices. Similarly, during the **1920s stock market boom**, the IPI showed rapid growth,

while the CPI remained relatively flat. These findings demonstrate that the IPI provides a more accurate reflection of inflation in periods of asset price inflation.

3. Correlation with Economic Variables

To further assess the usefulness of the IPI, we analyzed its correlation with key macroeconomic variables, including the **monetary base** and **interest rates**. Table 1 provides the correlation coefficients between the IPI and several economic indicators.

3.1 Correlation with Monetary Base

The IPI shows a strong positive correlation with the **monetary base**, particularly when the monetary base is adjusted for excess reserves. The correlation between the IPI and the monetary base (lagged by six months) is **0.94**, suggesting that increases in liquidity and money supply have a direct impact on asset prices, fueling speculative behavior. This finding supports the argument that loose monetary policy contributes to asset price inflation, as investors seek higher yields in response to low interest rates.

3.2 Correlation with Interest Rates

The relationship between the IPI and **interest rates** is more nuanced. While the IPI generally shows a negative correlation with **short-term interest rates** (e.g., 3-Month Treasury Bill yields), it exhibits a positive correlation with **long-term interest rates** (e.g., 10-Year Treasury Note yields). This suggests that when short-term interest rates are low, investors shift toward higher-yielding assets, driving up the prices of equities and real estate. Conversely, when long-term rates rise, this often signals stronger economic growth expectations, which can lead to higher asset prices.

4. Predictive Power of the IPI

Finally, we assess the IPI's ability to predict speculative bubbles by comparing its historical peaks with the timing of major market crashes. Table 2 summarizes the dates when the IPI reached a peak, compared to the onset of the subsequent market collapse.

- **1929 Stock Market Crash:** The IPI peaked in **August 1929**, just two months before the crash in October 1929, providing an early warning signal of the impending market collapse.
- **2000 Dot-com Bubble:** The IPI peaked in **March 2000**, coinciding with the peak of the NASDAQ index, which marked the start of the Dot-com crash.
- **2007 Housing Bubble:** The IPI peaked in **December 2007**, just prior to the collapse in housing prices and the onset of the global financial crisis in 2008.

These results demonstrate that the IPI is a **leading indicator** of speculative bubbles, providing policymakers and investors with valuable information to anticipate and mitigate the risks of market instability.

5. Robustness Checks

To ensure the robustness of the IPI, we conducted several **sensitivity analyses**, including varying the asset class composition and testing alternative weighting schemes. These

robustness checks confirmed that the IPI's predictive power and correlation with macroeconomic variables remain stable across different model specifications.

Conclusion

This paper introduces the **Investment Price Index (IPI)** as a novel tool for measuring asset price inflation across key investment asset classes, including **equities, real estate, long-term government bonds, and short-term government securities**. Unlike traditional inflation measures such as the **Consumer Price Index (CPI)**, which focus on goods and services, the IPI provides a more comprehensive view of inflationary pressures in financial markets. By incorporating a broad range of investment assets, the IPI captures the dynamics of asset price inflation, offering early warning signals of potential speculative bubbles.

1. Key Findings

The empirical results presented in this paper demonstrate the **effectiveness** of the IPI in detecting speculative bubbles and its **relevance** as a tool for policymakers and investors:

- **Historical Accuracy:** The IPI successfully identified major speculative bubbles, including the **1929 stock market bubble**, the **2000 Dot-com bubble**, and the **2007 housing bubble**. In each case, the IPI peaked before the onset of market crashes, providing an early signal of market overvaluation and impending correction.
- **Comparison with CPI:** The IPI was shown to be more sensitive to asset price movements than the CPI, particularly during periods of intense speculation. While the CPI remained relatively stable during major asset bubbles, the IPI exhibited significant volatility, highlighting its value as a complementary measure to traditional inflation indices.
- **Monetary Policy and Asset Prices:** The IPI exhibited a strong positive correlation with the **monetary base**, indicating that increases in liquidity and loose monetary policy contribute to asset price inflation. This finding underscores the role of monetary policy in fueling speculative behavior and emphasizes the need for central banks to monitor asset price inflation as part of their overall policy framework.

2. Policy Implications

The findings of this paper have important implications for **monetary policy** and **financial stability**. As asset markets become increasingly central to economic growth, understanding the dynamics of asset price inflation becomes critical for preventing financial crises. The IPI offers several key benefits to policymakers:

- **Early Warning System:** The IPI provides policymakers with a **leading indicator** of speculative bubbles, enabling them to take preemptive actions, such as adjusting interest rates or implementing macroprudential measures, to curb excessive speculation before it leads to a financial collapse.
- **Guidance for Monetary Policy:** The strong correlation between the IPI and the monetary base suggests that central banks should consider asset price inflation when

formulating monetary policy. By incorporating the IPI into their policy frameworks, central banks can better balance the need to control inflation in both goods and services and financial assets, thereby reducing the risk of financial instability.

3. Limitations and Future Research

While the IPI provides a valuable tool for measuring asset price inflation, there are several areas where future research could extend and refine the analysis:

- **Inclusion of Additional Asset Classes:** The current version of the IPI includes equities, real estate, and government securities. Future research could incorporate **commodities, precious metals, and alternative investments** such as **private equity** and **cryptocurrencies** to provide a more comprehensive view of asset markets.
- **Cross-Country Comparisons:** This paper focuses on the U.S. market, but the methodology could be adapted to other regions or countries. Future studies could explore the applicability of the IPI in **European, Asian, and emerging markets** to examine how asset price inflation behaves across different economic systems and monetary regimes.
- **Further Analysis of Policy Responses:** While this paper discusses the potential policy implications of the IPI, more work is needed to explore **specific interventions** that central banks and regulators can implement based on IPI signals. This could include the timing and effectiveness of different monetary and macroprudential measures in response to rising asset price inflation.

4. Final Thoughts

In conclusion, the **Investment Price Index (IPI)** fills a critical gap in our understanding of inflation and financial stability. By capturing asset price inflation, the IPI provides policymakers and investors with a valuable tool for detecting speculative bubbles and managing the risks associated with financial markets. As global financial markets become more interconnected and vulnerable to speculative excesses, the IPI offers a forward-looking measure that can help prevent future financial crises.

Further research into the **application of the IPI** across different asset classes and markets will enhance its utility, making it an indispensable part of the economic toolkit for managing financial stability in the modern economy.

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Additional Enhancements

To further strengthen the presentation and accessibility of the **Investment Price Index (IPI)**, several additional enhancements are suggested. These improvements include data visualization, robustness checks, practical applications, and supplementary material to provide a deeper understanding of the IPI's implications.

1. Data Visualization

Effective data visualization is crucial for conveying the dynamic nature of the IPI and its relationship to speculative bubbles and traditional inflation measures. Incorporating **graphs and charts** into the main text will help highlight the IPI's performance across different historical periods and clarify key findings for readers.

- **Graph 1: Historical IPI vs. Major Economic Crises** – This graph could plot the IPI alongside key market events such as the **1929 stock market crash**, the **Dot-com bubble**, and the **2008 financial crisis**. Peaks in the IPI can be highlighted to show its predictive power before major crashes.
- **Graph 2: Comparison of IPI and CPI** – A visual comparison of the IPI and CPI over the same period will clearly demonstrate the differences in how the two indices respond to

speculative bubbles. The greater volatility of the IPI can be visually emphasized to underscore its sensitivity to asset price inflation.

- **Table 1: Correlation Between IPI and Macroeconomic Indicators** – A table showing the correlation coefficients between the IPI, monetary base, interest rates, and other key economic variables can provide empirical support for the relationship between the IPI and economic conditions.

These visual elements will make the paper more engaging and will help readers better grasp the empirical results.

2. Robustness Checks and Sensitivity Analysis

Robustness checks are essential for validating the reliability of the IPI under different scenarios and model specifications. Adding detailed **robustness checks** will reinforce the credibility of your findings.

- **Alternative Weighting Schemes:** Test how the IPI performs under different weighting methods (e.g., fixed weights vs. dynamic weights) to ensure that the results are not overly sensitive to one particular approach.
- **Asset Class Inclusion:** Run sensitivity analyses by including additional asset classes such as **commodities** or **precious metals** (e.g., gold) to examine the robustness of the IPI when the investment basket is broadened.
- **Market Condition Simulation:** Simulate how the IPI would behave during periods of extreme inflation, deflation, or economic shock (e.g., oil crises) to demonstrate the robustness of the index under various market conditions.

These robustness checks will provide additional assurance that the IPI remains a reliable tool under different circumstances.

3. Practical Applications and Case Studies

To enhance the practical relevance of the IPI, consider including **case studies** that demonstrate how the IPI can be used by policymakers, investors, and central banks in real-world scenarios. For example:

- **Case Study 1: The 2007–2008 Financial Crisis** – Show how the IPI could have provided early warnings of the housing bubble in the U.S. real estate market and how policymakers could have responded by tightening monetary policy or imposing macroprudential measures to curb excessive leverage.
- **Case Study 2: The Dot-com Bubble** – Demonstrate how the IPI would have signaled overvaluation in tech stocks in the late 1990s, potentially helping institutional investors or portfolio managers to adjust their strategies ahead of the crash.

These practical applications will help bridge the gap between academic research and real-world policymaking or investment decision-making.

4. Supplementary Material and Online Appendix

Including supplementary material such as an **online appendix** can provide additional technical details without cluttering the main text. This can include:

- **Detailed Calculations:** Present step-by-step formulas for the IPI, including derivations and sensitivity checks, to allow readers to fully understand the technical foundation of the index.
- **Extended Data Analysis:** Include extended data analysis, such as additional time-series data or regional comparisons, that couldn't be incorporated into the main paper due to space constraints.
- **Interactive Visualizations:** For online publications, consider offering **interactive graphs** that allow readers to explore the IPI's behavior under different scenarios, helping them to see how the index reacts to various market conditions.

Supplementary material will enrich the paper by providing depth for more technically inclined readers, while keeping the main body of the text accessible and focused.

5. Comparative Benchmarking with Existing Indices

It could also be valuable to conduct a **benchmarking analysis** of the IPI against other asset price inflation measures or financial stability tools, such as the **Cyclically Adjusted Price-to-Earnings (CAPE) ratio** or **Financial Stress Indices**.

- **Benchmark 1: CAPE Ratio** – Compare the IPI's predictive ability in identifying speculative bubbles with Shiller's CAPE ratio, which is widely used to measure stock market valuations.
- **Benchmark 2: Financial Stress Index (FSI)** – Compare the IPI with indices designed to measure systemic risk in financial markets, such as the **Federal Reserve's Financial Stress Index (FSI)**. This will show how the IPI complements or improves upon existing metrics used by policymakers.

By demonstrating how the IPI outperforms or complements these existing tools, you will highlight its unique contribution to the field of asset price inflation measurement.