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Research Article

Innovative HKD Link Exchange Rate Arbitrage Model Under the HKMA Monetary System (Mirror Model)

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Abstract
This research proposes a novel approach initiative to enhancing the link exchange rate system, emphasizing a shift from passive regulatory oversight to active market mechanics. The initiative intends to harness market forces as a primary mechanism for system stabilization, rather than depending exclusively on interventions by governmental authorities or central banks. In an increasingly interconnected global economy, where capital flows and currency valuations can change rapidly, it is crucial to develop methodologies that enable real-time responsiveness to market fluctuations. Key to this innovative initiative is to implementation of an arbitrage mechanism, which serves as a critical financial strategy employed by traders to exploit price discrepancies across different markets. By facilitating swift adjustments in currency values, arbitrage not only aids in aligning exchange rates but also mitigates the impact of speculative bubbles and excessive volatility on financial markets. Moreover, the research advocates for the integration of advanced analytical frameworks and econometric models to better predict and understand market behaviors. This will provide stakeholders with the tools necessary to make informed decisions rooted in robust data analysis and empirical evidence. Ultimately, by activating the inherent dynamics of the market through structured arbitrage, this research highlights a paradigm shift that aims to empower investors and institutions alike, promoting a more resilient exchange rate system that is less susceptible to systemic risks and more reflective of actual economic conditions.
Keywords: Mirror Effect**,** Mirror Model, Risk-Rate Model, Arbitrage, Link Exchange Rate, Finance and Banking, Currency Board System.

Introduction

Hong Kong's interbank offered rate has experienced an unusual decline in recent weeks. From a peak in early May, it decreased to over 4%. As of May 4, the one-month interbank offered rate declined to 0.75%, representing a reduction of 4 basis points and 3%. Within just three weeks, it sharply decreased by 3.25%, an unprecedented record. This development is notably atypical. Usually, a disparity exists between the interest rates of Hong Kong and the United States due to the linked exchange rate system. Historically, market participants have closely monitored these records, and, for the most part, the interest rate differentials between the two jurisdictions have remained around 1% or less, occasionally exceeding 2%. In this instance, however, the differential is extraordinary-over 3%. This marks an unprecedented occurrence since the implementation of the linked exchange rate (HKMA, 2025).

What's behind the scenes, specifically, the interest rate differential between Hong Kong and the United States. There may be certain imperfections within the linked exchange rate mechanism. To thoroughly comprehend it, an initial understanding of the currency board system is essential.

Currency Board System

Under the currency board system, arbitrage activity is associated with the exchange rate linked to the Hong Kong dollar. This mechanism functions by attracting capital to Hong Kong, which consequently results in the appreciation of the dollar, an increase in its value, and an expansion of supply, thereby leading to lower interest rates. When interest rates in Hong Kong banks decline, the disparity between the two rates should widen. This widening gap would, in theory, provoke an arbitrage response (HKMA, 2018).

The currency board system operates on the principle of maintaining a fixed exchange rate between the domestic currency, namely the Hong Kong dollar (HKD), and a foreign reserve currency (US dollar). This system guarantees that for each unit of HKD in circulation, an equivalent amount of foreign currency is held in reserve, fostering stability and confidence in the currency (HKMA, 2019).

In the context of the HKD, when capital inflows into Hong Kong are robust, the demand for the HKD rises, causing its value to appreciate against other currencies. As foreign investments increase in the local markets, the higher demand for HKD leads to a greater supply of the currency in circulation. This increased supply typically results in lower interest rates within Hong Kong's banking system. Such lower interest rates can create a spread compared to those in other countries, presenting opportunities for arbitrage or investment strategies profit.

The Underlying Problem Causing This Phenomenon (HK Money Flow)

The current linked exchange rate regime in Hong Kong is quite rigid, which raises some concerns about whether it still fits well with the current economic climate. It's worth considering if Hong Kong's economic cycle is now moving differently from that of the United States. Even with these differences, it remains really important to keep a stable linked exchange rate system because it helps maintain market confidence and reduces currency risks. In this research paper, we will explore this topic in greater depth.

Following the discussion, there was a noticeable drop in market indices, causing mixed feelings among stakeholders. Some market participants felt pleased due to the sharp decline in interest rates, which could boost borrowing and investment. However, others expressed concerns about the long-term effects of such volatility on the economy.

Due to the sharp decline in bank interest rates, the bank's fixed Hong Kong dollar time deposits have nearly lost their one-month value. Consequently, interbank interest rates have experienced a significant decrease, prompting banks to reduce their discounts on time deposits. The interest rate in Hong Kong has recently declined substantially. This decline initiated earlier this month, following a considerable influx of funds into the city, which compelled the Hong Kong Monetary Authority to increase its demand for funds. The strong Convertibility Guarantee of the Hong Kong dollar prompted the supervisory authority to freeze the exchange rate. The inflow of U.S. dollars resulted in a sell-off of Hong Kong dollars, leading to an increase in the banking system's reserves within a few weeks.

Discussion

Explicit Meaning

To elucidate this phenomenon, it is essential to examine the surge of capital, notably due to the numerous new IPO listings on the Hong Kong Stock Exchange, which have contributed significantly to capital inflows. According to records from our banking system, nearly RMB 50 billion has been infused into our banking sector. Currently, our RMB balance sheet stands at approximately RMB 900 billion. This serves as clear evidence of a substantial influx of new funds (HKMA, 2025).

A large amount of money is flowing into Hong Kong, driven by various factors. For example, CATL raised nearly $40 billion in new shares, followed by the freezing of hundreds of billions of dollars. Additionally, many Hong Kong-listed companies had to pay out Hong Kong dollar dividends in the first half of the year, which created a huge demand for funds that has temporarily increased.

According to the Hong Kong Monetary Authority's own explanation, they attribute this to rising demand for investment activities related to Hong Kong stocks. However, it is perplexing. If such substantial capital is entering the market, one would expect an increase in Hong Kong stocks. Nevertheless, the magnitude of the increase does not appear to directly correspond with the inflow of funds. Except for CATL, the transaction volume only experienced a slight increase on the day of listing (HKMA, 2025).

Technically, when interest rates at Hong Kong banks fall, the gap between the two rates should widen. This, in turn, would theoretically trigger an exchange response.

Essentially, the available funds should be converted to U.S. dollars to address the high-interest rate environment. With the U.S. dollar's one-month interest rate near 4% and Hong Kong's at 0.75%, there is a 3.25% interest rate gap. The one-link replacement mechanism enables Hong Kong dollars and U.S. dollars to act as equivalent currencies, similar to holding U.S. dollars. If you trust the linked exchange rate mechanism,

your funds should be in U.S. dollars. Under the I-Federation mechanism, a currency board indicates increased demand for U.S. dollars.

The drop in demand for the Hong Kong dollar has caused interbank interest rates to dip slightly. Recently, rates have edged higher than before, exceeding the strong party's convertibility guarantee of approximately 7.8 HKD to 1 USD. A decline in interbank rates is uncommon, as reflected in the chart's ongoing trend.

Over the past decade, interbank interest rates have never unexpectedly spiked to 4% even briefly before sharply dropping to 0.75%, setting a record. Between 2020 and 2022, the Hong Kong dollar's interbank rate stayed close to zero, reflecting the low rates of the U.S. dollar. The Federal Reserve's easing of monetary policy due to the pandemic, along with resumed bond purchases, caused U.S. rates to fall. As a result, the Hong Kong dollar's rates stayed low because the interest rate gap between the two currencies was unlikely to widen (HKMA, 2023).

Interest rates in the US remain high, with various factors affecting potential cuts this year. The recent sharp decline seems to stem from structural changes rather than temporary influences. This unusual trend hints at an implicit meaning behind it. A link between the US dollar and the Hong Kong dollar appears to impact capital flows. There might be a problem with the arbitrage mechanism, and we are examining this possibility to analyze it further (Implicitly).

The Implicit Meaning

The rationale underpinning the widening interest rate differential between Hong Kong and the United States transcends the previously discussed considerations, notably encompassing the phenomenon of capital parking. It is crucial to comprehend that prevailing asset prices are indicative of anticipated future economic conditions. This relationship suggests that the trajectory of current prices offers insight into foreseeable events, while the movement of capital itself conveys substantial information about future market dynamics. The market operates as a conduit of authentic communication, and astute investors have already adapted their strategies accordingly. This scenario suggests that capital residing in Hong Kong presents a comparatively lower risk profile than that found in alternative jurisdictions. Additionally, since interest rates are intrinsically tied to perceived risk, the varying levels of risk appetite among investors serve to highlight the interest rate gap that exists between Hong Kong and other countries.

Even so, the principles of the currency board system mean that the Hong Kong dollar's interest rate generally stays in line with the US dollar's over time. This connection highlights how Hong Kong's monetary policy is closely linked to the US's in the long run, with interest rate changes influencing each other.

Table 1. Hong Kong interbank offered rate (Source: HKMA, 2025).

Overnight	0.01 interest
One week	0.11 interest
One month	0.153interest
Three months	1.62 interest
Twelve months	3.00 interest

From an alternative perspective, the current discount of the Hong Kong dollar against the US dollar might be temporary. In the long run, economic fundamentals indicate that the interest rates of both economies will align, reflecting the stability and predictability of the linked exchange rate system. This alignment is important because it signals a return to normal monetary conditions in Hong Kong, where external shocks and local economic changes are gradually integrated into a unified financial system.

So, here is an innovative idea for a suggestion: by utilizing the risk and rate method, we can modify the link exchange rate in a more systematic way that follows the arbitrage system, driven by market forces to initiate the link exchange rate. This research paper's idea is far better than the traditional method of merely using the authorities' power to manipulate the market. My research initiative is to utilize the market arbitrage mechanism to protect the link exchange system. When external forces attack the HKD, the risk of the HKD increases, and consequently, the interest rate of the HKD also rises, reflecting a mirror effect of the current situation. When the risk of HKD is high, the rate of the HKD will also be high, and vice versa. My innovative research model, let’s call it the Risk-Rate model (RR model), aims to activate market forces, the invisible hand, to address the link exchange rate problem rather than relying solely on the authorities' power.

Utilizing the arbitrage system to activate and engage market forces in addressing the link exchange problem is a much more ideal and mature method for correcting the link exchange rate issue.

Innovative Mirror Model (Mirror Effect)

Mirror arbitrage generally refers to exploiting price differences involving "mirrored" or synthetic, particularly in the context of mirror arbitrage trading strategies, especially in the currency markets. In this research paper, we focus on the method to activate an automation of mirror arbitrage system, that is, the risk ratio will be as a mirror effect that reflects in the rate of interests, so, when there is a currency crisis, that mean, the currency is being attack, so, the risk-rate system (mirror system), will be activate, therefore, the rate of interest will be driven to as high as the risk of the currency level, at the same level.

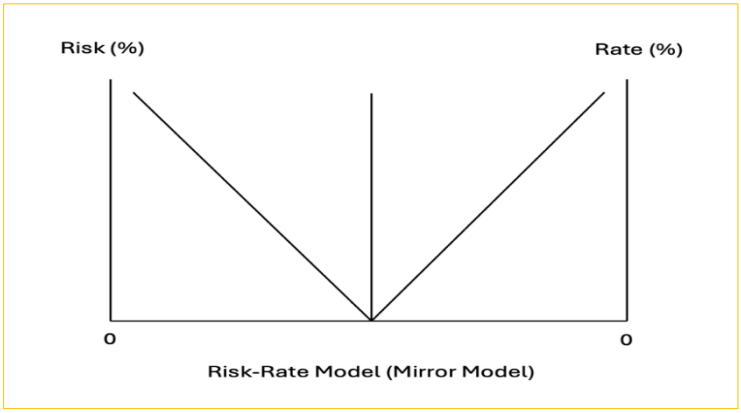

Figure 1. Risk-rate model (mirror model) (Source: Author view).

The mirror practice allows for the creation of synthetic arbitrage ("mirror-effect") that mirror the price of real-world assets like currency on the bilateral currency exchange. Traders can take advantage of price discrepancies between these synthetic assets and their real-world counterparts or across different exchanges to perform arbitrage, profiting from the price of differentials.

On a broader level, "mirror arbitrage" is a specific concept mainly used in traditional financial markets, like forex. It's an arbitrage strategy where investors automatically follow the arbitrage currency trades of experienced traders in real time. Automated platforms replicate the selected trader's actions, letting investors benefit from expert strategies without manual involvement. The goal of mirror trading is to minimize emotional trading decisions and provide diversification, as well as access to advanced trading techniques.

Suggestion

Optimization modifications can be implemented in the arbitrage mechanism and the capital currency pool function. The carry rate ratio and risk ratio function as pricing tools to adjust the price and sustain the linked exchange rate. This enables currencies from both regions to be hedged more efficiently. A new optimized logarithmic channel provides the foundation for price adjustment, carry, and risk hedging to balance interest rates and risks. Consequently, the arbitrage function can be used effectively.

Table 2. Innovative HKD link exchange rate mirror arbitrage model.

7.9	A	Section A Intervention p.t.
7.85	B	
7.8	C	Section BCD Non-intervention p.t.
7.75	D	
7.7	E	Section E Intervention p.t.

Max Arbitrage Gain HKD 7.85-HKD 7.75=HKD 0.1
Max 0.1 to Min 0.01→ 0

$r_i = r_{risk}$

$$\frac{\partial(r_i)}{\partial(t)} = \frac{\partial(r_{risk})}{\partial(t)}$$

$$\frac{\partial(y)}{\partial(t)} = \frac{\partial(r_i)}{\partial(t)}$$

$$\frac{\partial(x)}{\partial(t)} = \frac{\partial(r_{risk})}{\partial(t)}$$

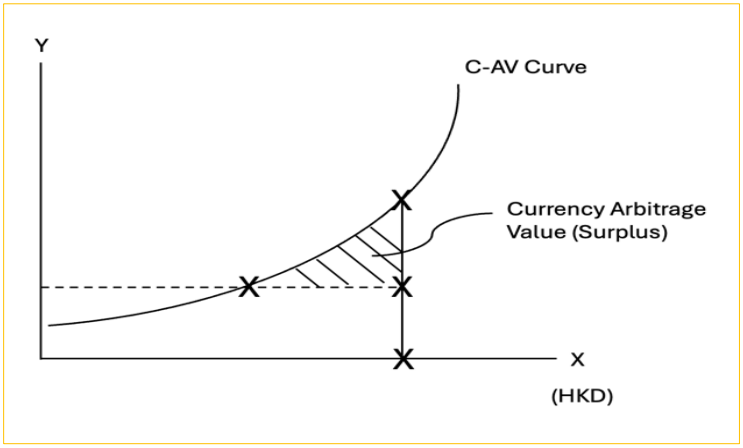

Figure 2. Innovative HKD link exchange rate arbitrage model (Source: Author view).

$$Area = \int \frac{\partial(y)}{\partial(t)} - \int \frac{\partial(x)}{\partial t}$$

$Area > 0\ Arbitrage$

$Area < 0\ \ Non\_Arbibitrage$

$Area = Currency\ Arbitrage\ Value\ (Surplus)$

Within a certain period (period of time), if there is a surplus area, currency arbitrage becomes possible. If there is a negative area or no surplus, then currency arbitrage is not possible. This paper proposes using the Hong Kong Monetary Currency Board System to suggest a modification to the price rate under the arbitrage mechanism.

In the above example, this means, in a specified period-often called a time frame-if there is a surplus area, it indicates opportunities for currency arbitrage. Currency arbitrage involves the simultaneous buying and selling of a currency across different markets to take advantage of price differences, thus generating profit.

On the other hand, if there is either a deficit area or no surplus area, currency arbitrage becomes impossible. In such cases, market conditions do not support the currency value differences needed to enable arbitrage opportunities, ultimately preventing profits from currency fluctuations across different markets.

Conclusion

This research proposes an innovative approach to modifying the link exchange rate system by the Artbritage model. The goal is to harness market forces to safeguard the system, reducing reliance on authorities. By employing the arbitrage mechanism, we can better manage market fluctuations with greater sophistication. In the short term, interest rates might not match those in Hong Kong and the US; however, throughout the long term, they are expected to synchronize due to the mechanics of a linked exchange rate system. This system requires domestic interest rates to align with those in major economies, ensuring currency stability and economic balance. Persistent deviations from international rates could threaten the peg's stability and affect capital flows, ultimately leading to rate convergence to preserve economic fundamentals. I hope this study will contribute to academia and benefit humanity.

The Innovative HKD Link Exchange Rate Arbitrage Model, implemented within the Hong Kong Monetary Authority's (HKMA) monetary system, is a sophisticated, rule-based currency board designed to maintain exchange rate stability. It leverages interest rate differentials-differences between Hong Kong dollar (HKD) and other currencies-and arbitrage mechanisms, where traders exploit price gaps to support the currency peg. The mirror model proved to be robust and credible, serving as a key pillar of Hong Kong's monetary and financial stability. Despite ongoing macroeconomic volatility, exchange rate fluctuations, and increased global financial integration, the Risk-Rate Model-its systematic, transparent, and rules-based intervention system-remains effective. It uses measures such as foreign exchange interventions and interest rate adjustments to uphold the currency peg reliably.

Declarations

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