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# The asymmetric impact of currency purchasing power imparities on ADR mispricing

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ABSTRACT

We investigate the influence of currency purchasing power imparities on the mispricing of American Depository Receipts (ADRs). Existing literature is mainly silent on this issue, despite the important implications such imparities have for potential exchange rate changes—and by extension, the returns on ADRs. We carry out our investigation using panel data and a sample of 218 ADRs and their underlying assets from 24 countries over the period from 1985 to 2013. We find robust evidence for a statistically significant relationship between currency purchasing power imparities and ADR mispricing. We show that a highly overvalued U.S. dollar is associated with larger (lower) ADR premiums (discounts), while a highly undervalued U.S. dollar is associated with lower (larger) ADR premiums (discounts). The finding suggests that the demand for ADRs increases as the U.S. dollar becomes more overvalued, driving up the price of the ADRs versus the underlying stocks. Finally, the results demonstrate the importance of considering exchange rate states when investigating the impact of currency movements on ADR pricing. We estimate our results for several sub-periods, as well as sub-samples of developed and developing countries.



## 1. Introduction

We analyze the impact of the currency purchasing power imparities on the potential price deviation between ADRs and their underlying stocks. The literature on ADR mispricing provides evidence that exchange rate changes are a factor in ADR pricing, concluding ADR investors are compensated for the foreign exchange rate risk inherent in the ADR (e.g., Liang and Mougoue, 1996; Choi and Kim, 2000; Kim et al., 2000; Aquino and Poshakwale, 2006). To our best knowledge, the impact of exchange rate imparities on ADR mispricing has been largely unexplored in the literature. We argue that the impact of currency imparities, specifically the overvaluation or undervaluation of the U.S. dollar versus the currency of the underlying stocks' home country, may provide an additional factor explaining ADR mispricing. This is our contribution to the existing literature on ADR mispricing.

If markets are efficient, exchange rate changes should adjust the U.S. dollar denominated price of the ADR to prevent any possible arbitrage profits. More specifically, a depreciating U.S. dollar should increase the U.S. dollar price of the ADR, while an appreciating U.S. dollar should decrease the price of the ADR. Additionally, the price of an ADR, as the price of any financial asset, is determined by the supply and demand; a more optimistic investor sentiment in the U.S. market versus the

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home market of the underlying asset may increase the demand for the ADR and ultimately its price. Studies by Suh (2003), Aquino and Poshakwale (2006) and Grossmann et al. (2007) find that ADRs are more impacted by U.S. investor sentiment and market factors than the sentiment of the home market. Given that a depreciating U.S. dollar increases the ADR's return, *ceteris paribus*, U.S. investors may allocate more funds towards ADRs when they expect the U.S. dollar to depreciate in the near future, while they may decrease their demand or sell their ADR positions when the U.S. dollar is expected to appreciate. Hence, any signal that influences ADR investors' expectations about the future movement of the U.S. dollar may influence the supply and demand for the ADR and its price. International financial literature provides evidence that exchange rates, which deviate from purchasing power parity equilibrium (PPP), move back towards PPP equilibrium in the medium and short-run (e.g., Breuer, 1994; Froot and Rogoff, 1995; Lothian and Taylor, 1996; Taylor, 2002; Xu, 2003; Taylor and Taylor, 2004; Wallace and Shelley, 2006). Hence, investors may expect that an overvalued (undervalued) U.S. dollar depreciates (appreciates) in the future in expectation of higher (lower) returns. Consequently, ADR investors may increase (decrease) their positions when the U.S dollar is overvalued (undervalued), driving up (lowering) the U.S. dollar price of the ADR versus the underlying stock, hence, contributing to ADR mispricing, *ceteris paribus*. The literature provides some evidence that exchange rate deviations impact equity pricing. For example, Eichler (2011) shows that an overvalued Chinese yuan impacts ADR prices, suggesting that investors expect the Chinese government to devalue the yuan in an effort to restore competitiveness. Furthermore, Grossmann et al. (2017) demonstrate that the overvaluation and undervaluation of the U.S. dollar impacts U.S. investors demand for foreign equity securities.[1]

The literature points out that forces of PPP are rather weak when exchange rates fluctuate closely to their equilibrium value but become stronger when the exchange rate leaves the band close to equilibrium (e.g., Hakkio, 1992). Thus, it may be reasonable to believe that ADR investors do not have strong expectations about the future movements of the exchange rate as long as the exchange rate meanders close to equilibrium. On the other hand, if the exchange rate becomes highly overvalued or undervalued, investors may form an expectation that the exchange rate will move back to equilibrium in the future. Thus, ADR investors may not change their demand for ADRs as long as the U.S. dollar is close to equilibrium, but allocate more funds towards the securities when the U.S. dollar is highly overvalued.

Additionally, there may be an asymmetry effect with respect to the impact of an exchange rate risk premium on ADR mispricing depending on if the U.S. dollar is overvalued or undervalued. The literature suggests that policymakers may defend an undervalued currency more forcefully (Leon and Najarian, 2005). Glick and Rose (1999), Fernald et al. (1999) and Corsetti et al. (2000) relate the devaluation of the domestic currency in order to restore competitiveness to exchange rate movements, which in turn might influence the required currency risk premium by investors. Furthermore, if the state of the U.S. dollar changes ADR investors' expectation with respect to potential future returns, it may also impact their demand for a currency risk premium. Again, this asymmetric impact of exchange rate changes on ADR mispricing may not occur as the U.S. dollar moves close to equilibrium, but may become evident when the U.S. dollar is highly overvalued or undervalued.

Following the discussion above, the main purpose of this study is to investigate the impact of currency imparity on ADR mispricing. First, we measure exchange rate deviations as the difference between the actual U.S. spot exchange rate and a constructed relative PPP based equilibrium exchange rate (Hakkio, 1992). This provides us with a measure of the U.S. dollar's overvaluation and undervaluation and allows us to test for asymmetry effects depending on the U.S. dollar's stage. Other recent studies which have used a similar approach to measure exchange rate deviations from relative PPP are Simpson and Grossmann (2014) and Grossmann et al. (2017). Second, we investigate the impact of exchange rate changes on ADR mispricing when the U.S. dollar is overvalued versus when it is undervalued. We employ a panel data estimation method, controlling for transaction and holding costs, information asymmetry, for U.S. and home market sentiment, as well as exchange rate changes. Finally, we check the robustness of our results in different sub-periods, as well as in subsamples of developed and developing countries.

We find robust evidence for a statistically significant positive relationship between currency purchasing power imparities and ADR mispricing, suggesting that the demand for ADRs increases as the U.S. becomes more overvalued driving up the price of the ADR versus the underlying stock. Moreover, we document an asymmetry effect with respect to the state of the U.S. dollar and ADR mispricing; a highly overvalued U.S. dollar is associated with larger (lower) ADR premiums (discounts) while a highly undervalued U.S. dollar is associated with lower (larger) ADR premiums (discounts). Finally, we provide some evidence for an asymmetry effect of exchange rate movements on ADR mispricing depending on the state of the U.S. dollar. This suggests the state of the U.S. dollar impacts a potential currency risk premium inherent in the ADR price. The results hold consistently for several sub-periods, as well as sub-samples of developed and developing countries.

This paper is organized as follows. Section 2 discusses the literature on ADR mispricing and ADR arbitrage. Section 3 presents the data utilized in the study, as well as the methodologies. Section 4 discusses the results, and Section 5 concludes the paper.

[1] Grossmann et al. (2017) find that a strengthening undervalued U.S. dollar lowers the demand for foreign equity securities and a strengthening overvalued U.S. dollar increases the demand for foreign equity securities in developed countries; while it lowers the demand for foreign equity securities in developing countries.