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FINANCIAL LOOTING AND CONTROLS ON RESIDENT OUTFLOWS

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ABSTRACT

This paper develops a theory of preemptive controls on capital outflows by residents as a second-best tool to mitigate boom-bust cycles in domestic asset markets and prevent wealth transfers from uninformed traders to pump-and-dump speculators, or financial "looters," as in Akerlof and Romer (1993). The model implies that when domestic financial regulation is imperfectly designed or enforced, controls on residents' outflows reduce retail investor manipulation (which we call looting), stabilize asset prices, and diminish capital flight. The paper also provides compelling evidence that supports the main implications of the model when applied to housing markets, which is particularly relevant to institutions in developing countries. We find that deposit outflows to haven countries increase before busts in house prices, and countries with stricter controls on resident outflows experience significantly more contained deposit outflows to such destinations. The empirical analysis reveals a similar pattern for new incorporations in haven countries based on data from the Panama Papers.

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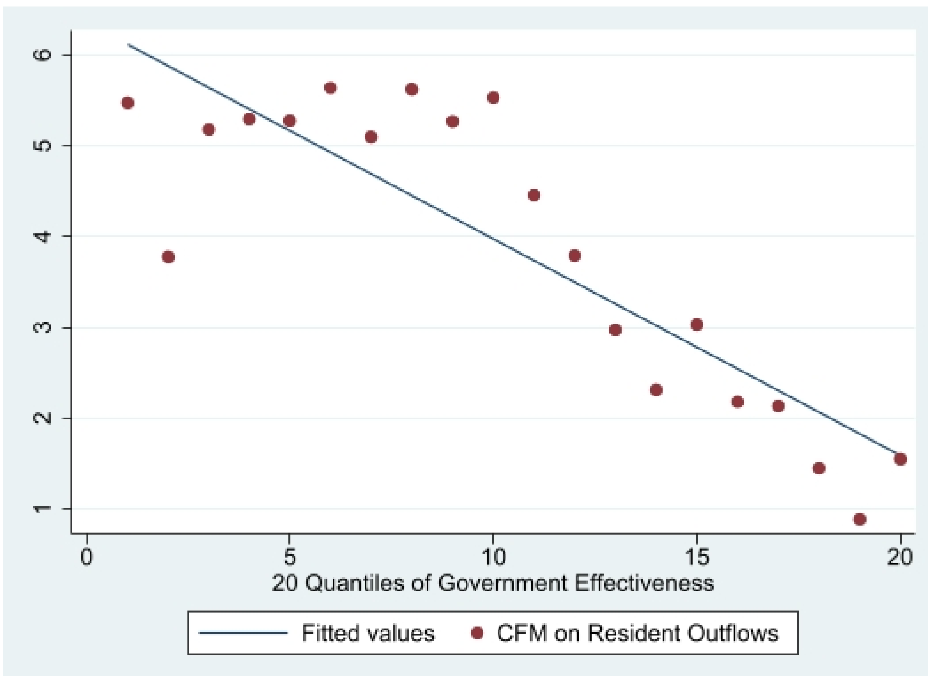
1 Introduction

The Washington consensus used to maintain that the free mobility of foreign capital can contribute to the development of strong domestic institutions. This paper proposes a theory that explains how allowing the residents of countries with weak institutions to freely move capital abroad can result in exploitation of uninformed investors, who comprise the majority of market participants in these nations, and the generation of excess volatility in domestic asset markets. In this context, implementing preemptive controls on capital outflows by residents can mitigate the negative impact of weak institutions, helping to contain pump-and-dump trading and boom-bust cycles in domestic asset markets and retail investor exploitation. The paper also presents evidence based on deposit outflows to haven countries, new incorporations in offshore centers, housing prices, and resident outflow controls that aligns well with the model's main predictions.

In our model, capital controls on residents' outflows complement a domestic regulatory framework in which (perhaps because of weak institutional capacity) regulations cannot enforced uniformly across all agents. Figure 1 illustrates that, in the data, the use of outflow controls on residents is strongly associated with lower levels of institutional development. That is the lower the government's effectiveness, the more extensive the use of controls on residents' outflows. Most advanced economies stopped using outflow controls in the 1980s, except for national security and anti-money laundering purposes. This association (which, of course, does not imply causation) does not depend on the particular indicator used to measure the degree of institutional development or capital account restrictions on residents.

In the paper, we also discuss anecdotal evidence on the prevalence of financial "looting" (in the spirit of Akerlof and Romer, 1993) in both advanced and emerging economies and its importance in capital outflows in emerging economies. Based on housing price data from the 1990s for a large sample of both developed and developing economies, we then show that when real housing prices increase, a higher stringency of outflow controls on residents is significantly associated with lower growth of off-shore deposits in more opaque financial centers (as in Andersen, Johannesen and Rijkers, 2022), as our model predicts. Although ultimately suggestive, this evidence is strong and robust.

Figure 1: Government Effectiveness and CFMs on Resident Outflows



Note. The figure plots the association between government effectiveness and the prevalence of capital controls on residents' capital outflows. The horizontal axis has the 20 quintiles of the government effectiveness index from the World Bank Worldwide Governance Indicators. The vertical axis is the average value of controls on residents' capital outflows within each quantile of government effective index. Controls on residents' capital outflows is measured as the sum of controls on residents' outflows for ten asset categories in Fernandez et al. (2016). The sample covers 100 economies from 1995 to 2019. See the empirical Section 5 of the paper for more details on the definition of the resident outflow control index.

Building on the work of Akerlof and Romer (1993–henceforth AR) on the financial (in)stability consequences of imperfectly designed government regulation of domestic banks and corporations, our model shows that preemptive controls on capital outflows of domestic residents can mitigate boom-bust cycles in asset prices and speculative bubbles by deterring (or contributing to deter) the market entry of looters that exploit uninformed retail traders to their advantage, inflating asset prices above their fundamental values and inducing the boom-bust cycle in asset prices.

The model starts with the domestic market of an asset in exogenous and fixed net supply and three types of domestic traders: fundamental investors, speculators that following AR we call looters, and naïve or retail investors that are honest but uninformed. Fundamental investors are fully informed on the true asset value. They buy low and sell high. Looters are "pump and dump" traders. Naïve investors engage in positive feedback or momentum trading, as in Delong et al. (1990), buying or selling the domestic asset when the price goes up or down. There are four trading periods. In period 0, the demand of fundamental investors meets the fixed asset supply. In period 1, the looters endogenously choose to enter the market and push up the asset price, taking into account the incentives provided by the policy regime. In period 2, uninformed naïve investors buy the asset after observing the previous price increase as a signal of its unknown fundamental value, while looters sell the asset and choose to either stay in the country facing a regulatory penalty or flee, incurring a cost to circumvent outflow controls and cover relocation expenses. In period 3, the asset's true value is revealed, and the price returns to its fundamental value. The larger the mass of looters entering the market in period 1, the bigger the boom-bust cycle in the asset price and the implicit wealth transfer from naïve traders to looters. These effects and the associated asset price dynamics are stronger the larger the share of naïve traders in total traders or the more sensitive they are to changes in asset price dynamics.

To curb speculation, the regulator imposes an idiosyncratic penalty on looters. The regulator is assumed unwilling or unable to impose uniform penalties. Looters can either face the penalty or evade it by incurring costs to bypass capital outflow controls and cover any relocation expense. In the model's solution of the market equilibrium, preemptive controls on resident outflows not only directly limit capital flight in period 2, but importantly, also reduce the entry and speculation in period 1. Preemptive controls on resident capital flows, therefore, can mitigate the resulting asset price boom-bust cycle. We also find that an *ex-post* outflows tax that achieves the same stabilizing impact on capital outflows is much higher than the corresponding ex-ante (preemptive) tax rate.

The connection between our asset market speculators and AR's looters is indirect. Additionally, AR's notion of financial looting is nuanced.[1] Writing at the time of the S&L crisis in the United States in the early 1990s, AR start from the characterizing business strategies that lead to *bankruptcy for profit* and the observation that such strategies entail a large discrepancy between the gains captured by "owners going for broke" and the social losses they generate. Consequently, they refer to "bankruptcy for profit" as "looting" because the private gains are smaller than the social cost imposed, as in a riot with looting.

They begin their analysis by assuming that the government agrees to inefficient contracts embedded into domestic financial laws and regulations such as limited liability and deposit insurance that permit the emergence of legal or semi-legal market practices without explicitly providing a theory for the emergence of these institutional arrangements, but rather focusing on the consequences for market outcomes. Next, they describe the behavior of the private sector that responds to incentives provided by these inefficient government contracts and regulations. They then discuss several historical examples of the interaction of private and public sectors that can lead to financial excesses, boom-bust cycles in asset prices, and social losses.[2]

The critical contribution of our model is to endogenize the looters' entry, which is exogenous in AR's setting. Specifically, our model builds on one particular variant of AR's looting model that AR use to explain the boom-bust cycle in land prices in Dallas, Texas during the S&L crisis (See AR pp.36-39). Just like AR, we take the inefficient government regulatory regime as given, and examine how looters can exploit the lack of information of naïve traders to their advantage. Akin to their argument on the legal nature of looting in American financial markets, we do not dwell on the legal or semi-legal nature of the spe-

[1]The English definition of "looting", according to the Merriam-Webster dictionary, is the act of robbing "especially on a large scale and usually by violence or corruption".

[2]In some instances, the private sector behavior and practices are legal, while in others the private activities are fraudulent, but this distinction plays a secondary role in their analysis.

cific financial practices utilized to exploit uninformed retail traders. However, we introduce heterogeneous looters and endogenize their entry into the market. We then analyze the impact of capital outflow controls and regulatory penalties on the share of looters entering the market. Furthermore, while in our model looters exploit naïve traders and the latter are feedback traders with upward-sloping asset demand curves as in AR, the functional form of the naïve traders' asset demand, strictly speaking, does not share the same microfoundation.

The paper also directly explores the model's main prediction with data on housing prices, capital controls, and offshore deposits to haven and non-haven counties. The empirical analysis focuses on understanding the repercussions of capital controls on residents' outflows toward more opaque financial centers as in Andersen, Johannesen and Rijkers (2022). Following Andersen et. al. (2022), we examine resident outflows into offshore bank deposits in countries that are more protective of secrecy when domestic housing markets boom and then bust. The empirical analysis is based on unbalanced panel data for 48 developed and developing economies from 1990 to 2022. We find a strong and robust association between housing price booms and increased outflows to bank deposits in haven countries that is significantly weakened when a country has capital controls on resident outflows, consistent with our model's main prediction.

The empirical analysis also documents that deposit outflows to haven countries are more pronounced during the late boom phase of a housing cycle, just before a bust. However, resident outflow controls significantly temper such outflows. Furthermore, an analysis of corporate profits in the non-financial corporate sector, used as a placebo test, shows that higher corporate profits are significantly associated with lower outflows to banks in haven countries when there are no capital controls. This suggests that outflows to haven banks during housing booms are not primarily driven by wealth effects or typical tax avoidance. Additionally, when we examine new incorporations in offshore centers during housing booms based on data from Panama Papers, we find that new incorporations in these centers increase during housing boom periods, especially when followed by busts. Once again, controls on resident outflows reduce the rate of new offshore incorporations during these periods, suggesting that capital controls can deter the creation of offshore entities intended to circumvent domestic regulations during housing market fluctuations.

The main policy implication of the analysis is that when domestic financial market regulation is poorly designed or enforced due to weak institutional capacity, potentially leading to looting-type behavior in asset markets, preemptive outflow controls can provide valuable redistributive and financial stability benefits. In our model, these controls can complement domestic regulation and stabilize boom bust in domestic asset price when there are failures in markets, government, and international regulations. The market failure embedded in the model is retail investors' naiveté stemming from asymmetric information and reflected in their upward-sloping asset demand. Government failure is represented by the limited capacity to design or enforce effective regulations for domestic asset markets resulting heterogeneous penalties across traders. The third imperfection baked into the analysis is the lack of international coordination mechanisms to reclaim funds that exit a country in violation of domestic regulations or capital control laws, or through outright illegal activity. In our framework, weak institutional capacity persists, regardless of whether the financial account is open or closed.

Within the IMF's Institutional View on the Liberalization and Management of Capital Flows (IV, 2022), controls on capital outflows may be appropriate only in crisis or imminent crisis circumstances, and the use of outflow controls should not substitute for warranted macroeconomic adjustment—e.g., IMF IEO (2020, 2022), and Ostry and Stiglitz (2022). As discussed in the IV Guidance Note (2023), when the IMF staff's assessment is that there is no immediate threat of a crisis, disruptive outflows can be handled through macroeconomic, financial, and structural policies. According to this framework, the macroeconomic policy response should address the domestic triggers and implications of outflows and foster orderly external adjustment if warranted. Furthermore, the combination of policies should be based on macroeconomic conditions, taking into consideration financial stability risks, including balance sheet foreign exchange exposures, and any need for the adjustment of policies that may have contributed to outflows in the first place. When capital account liberalization outpaces the capacity of the economy to safely handle the ensuing capital flows, a temporary reimposition of outflow CFMs may be appropriate under the IMF's Institutional View.[3]

[3]According to the IMF's Institutional View, even in the absence of a capital inflow surge, preemptive capital flow management measures that are also macroprudential measures (CFM/MPMs) on inflows may be appropriate in some circumstances, for example, when potential systemic risks arise from either FX

Given that our model's outflow control does not focus on the cyclicality of capital flows, it does not fully align with the perspective outlined in the IV. Our theory suggests that outflow controls could be considered in situations where the capacity to design, implement, and enforce domestic financial regulations is insufficient compared to the potential macroeconomic and financial stability risks associated with domestic financial liberalizations. Notwithstanding the conclusions in this discussion paper, it acknowledges that IMF policy advice remains anchored by the IV.

Related Literature Following a long string of costly domestic and international financial crises in the 1990s and the 2000s, the literature on policies for financial stability has mushroomed, stimulating renewed and strong interest in interventions that limit capital mobility—the so-called capital controls. This is a large literature, and our paper contributes along several dimensions.[4]

Numerous papers propose capital control theories grounded on the presence of pecuniary and demand externalities arising from occasionally binding borrowing constraints —-e.g. Bianchi (2011), Jeanne (2012), Benigno et al. (2013 and 2016), and Jeanne and Korinek (2020)–or whenever monetary policy cannot achieve the first best allocation as in Farhi and Werning (2014), Schmitt-Grohe and Uribe (2016). Other papers focus on capital controls as tools to gain international competitiveness as in De Paoli and Lipinska (2013) or Costinot et al. (2014). In these models, controls are typically imposed on net capital flows. Additionally, these papers mostly focus on frictions and distortions on borrowers, and hence on the asset supply side. This literature typically also assumes no "instrument frictions" on the government's part. Our focus is on resident outflows in the presence of distortions on the demand side of the asset markets, taking the government's inability to implement perfect

mismatches or from local currency external debt, in narrow and exceptional circumstances.

[4]See Magud, Reinhart, and Rogoff (2018) for a survey of the literature on capital control as policies aimed at addressing fear of appreciation, fear of hot money as in Tong and Wei (2011), fear of large capital inflows, and loss of monetary autonomy as in the trilemma of international finance. See Rebucci and Ma (2019) for a survey of the newer literature on capital controls as instruments to address pecuniary and demand externalities or to manipulate the term of trade. See Erten, Korinek and Ocampo (2019) for a survey of the new literature on macroprudential and capital flow management policies, encompassing the traditional literature on capital account liberalization more broadly. Basu et al. (2023), Adrian et al. (2020), and Borio, Shim and Shin (2022) examine various issues addressed in this literature from both a theoretical and operational policy perspectives.

domestic financial regulation to address these distortions as given in the spirit of Akerlof and Romer (1993).

Our paper also contributes to the literature on capital account liberalization and the development of the domestic financial sector. For example, Aoki, Benigno, and Kiyotaki (2009 and 2015) and Basu et al. (2020) illustrate how the optimal degree of capital account openness or the desirability of preemptive CFMs depend on financial development. Stiglitz (2000) argues that restrictions on residents' outward investments should be lifted only gradually to protect reserves and maintain stability in the banking system that finances the domestic economy. Our model emphasizes the importance of taking into account the destabilizing impact of speculative activities stemming from the absence of effective regulation of such activities in the process of capital account liberalization.

Our paper contributes to the literature that examines the connection between the quality of institutions and CFM policy on capital inflows, as for example in Ma and Wei (2020) and Basu et al. (2020). These papers stress the potential benefits of restrictions on capital flows at an early stage of institutional development or in the presence of underdeveloped markets. We propose a novel mechanism that highlights how the quality of institutions can affect the desirability of preemptive CFM measures on capital outflows. A closely related paper, here, is Chang, Fernandez, and Martínez (2024), which also focuses on outflow controls, considering the ex-post introduction of outflow controls on nonresidents in the event of a crisis, and focusing on issues of imperfect credibility and limited commitment by the government. In this paper, we examine ex ante (i.e., preemptive) capital controls on residents' outflows in normal times as opposed to ex post.

Fernandez et al. (2016), Eichengreen and Rose (2014), and Acosta-Henao et al. (2021) find that countries do not use preemptive capital controls in a countercyclical way as the new theories suggest.[5] However, the use of persistent controls on outflows in middle and low income countries is widespread (e.g., Klein, 2012; Fernandez et al. 2016). One explanation of these facts is that capital controls signal future bad policies (Bartolini and Drazen, 1997).

[5] Based on more granular and updated data on policy adoption, Das, Gopinath, and Kalemli-Özcan (2022), not only show more adoption than previously reported, but also that preemptive inflow controls can reduce emerging markets and developing countries' external finance premia during risk-off shocks. However, they do not find such a stabilizing effect associated with outflow controls. We propose a different rationale for outflow controls adoption and find evidence of effectiveness.

Other explanations include, for example, that capital controls may distort the efficient allocation of savings, hinder risk sharing and limit diversification opportunities. Our theory rationalizes the use of capital controls in countries with weak institutions.

Our paper naturally relates to the extensive finance literature that highlights how the naïve behavior of certain investors can be exploited, as demonstrated by the works of Delong et al. (1990), Allen and Gale (1992), Akerlof and Romer (1993), Shiller (2003), Barberis and Thaler (2003), Gennaioli and Shleifer (2018), Hirshleifer (2015, 2020), and Akerlof and Tong (2021). For instance, DeLong et al. (1990) find that the early buying of rational traders can trigger positive-feedback trading of naïve traders, thereby increasing price volatility. Our model incorporates this feedback trading mechanism and examines how outflow controls can help stabilize the associated asset price dynamics. A closely related paper is Brunnermeier, Sockin, and Xiong (2022). They show that China's financial markets predominantly consist of uniformed retail investors, resulting in significant price volatility and high turnover rates.[6] They find that, by mitigating the market fluctuations caused by retail investors, government intervention can improve welfare. Our paper shares the focus on speculative activities in a market populated by naïve traders. By studying outflow controls in such a setting, we can evaluate its effects on both initial speculation and subsequent capital flight.

The literature provides various explanations for why countries may impose controls on capital outflows during non-crisis periods. One important explanation is the trilemma in international finance, which suggests that a country cannot simultaneously peg its exchange rate, maintain an independent monetary policy, and permit free cross-border financial flows. Therefore, capital controls may be used by countries to maintain a stable exchange rate or monetary independence, as discussed by Gourinchas and Obstfeld (2012), Rey (2013), Klein and Shambaugh (2015), Han and Wei (2018), Eichengreen and Esteves (2019) and Obstfeld, Ostry, and Qureshi (2019). In addition, capital controls on outflows can also be used for financial repression purposes as in Aizenman and Pasricha (2013), Liu et al. (2021). Aizenman and Pasricha (2013), in particular, find that the relaxation of control on outflows reduces fiscal revenues. Our paper contributes to this literature by illustrating how countries

[6]International benchmark-driven investors, akin to our naïve domestic investors, also play a critical role in driving capital flows in emerging economies (e.g., Arslanalp and Tsuda, 2015; Arslanalp et al. 2020).

with weak institutions may use capital controls on resident outflows to reduce speculation and related boom-bust cycles in domestic asset prices.

Finally, the paper build on and contribute to the literature on illicit financial flows survied, for example in Brandt (2023). For instance, Alstadsæter, Johannesen, and Zucman (2018) report that approximately 10 percent of the global GDP is held in tax havens, with significant variations observed across regions. Some world regions, in particular, exhibit proportions as high as 60 percent of their GDP being held in tax havens. Another trend identified by Andersen, Johannesen, and Rijkers (2022) is the correlation between aid disbursements to poor countries and significant increases in bank deposits in offshore financial centers known for their practices of bank secrecy and private wealth management. Their findings indicate that approximately 7.5 percent of the aid provided is redirected to offshore bank accounts. We provide extensive and robust empirical evidence of an association between housing booms and deposit outflows to haven countries that is significantly mitigated by controls on resident outflows.

The paper is organized as follows. Section 2 spells out the concept of financial looting and how our model relates to that. Section 3 describes the model and its solution. Section 4 presents the implications of the model. Section 5 empirically investigates the model implications. Section 6 concludes. The Appendix contains proofs and other details.

2 Akerlof and Romer's financial looting

In this section, we review the concept of financial looting in Akerlof and Romer (1993, henceforth AR) and provide some examples in the housing and equity markets that inform both our theoretical model and empirical analysis.

At the core of AR's concept of financial looting there is a limited liability corporation (a developer, an institutional stock investor, or a financial intermediary) and a government that is willing to bail out the lenders of these corporations for a notional value greater than the fundamental value of the assets they hold in their portfolios. Suppose a government agrees to bail out any lending to such corporations, only subject to the restriction that the owners/managers cannot divert more than a fixed amount. AR show that if the upper bound set on the bailout is smaller than the true value of the corporation's assets, the owner will maximize its value. However, if the bailout limit is allowed to be greater than the corporation's value, the owner levers up to the bailout limit and runs away with the funds, with no incentive to maximize the firm's value.[7]

AR call this "bankruptcy for profit" to distinguish it from bankruptcy for risk-taking. Moreover, and importantly, they take this seemingly irrational policy regime as given, arguing that it characterizes well government behavior even in advanced economies, such as the United States. They provide evidence of its prevalence in both advanced and emerging countries through examples and case studies. They also suggest that the distinction between legal and illegal practices that give rise to looting in their model is a second-order issue, which is reminiscent of the distinction between "tax avoidance" (which is legal) and "tax evasion" (which is illegal).

The land market and the stock market provide illustrative examples.[8] Consider a housing market working as follows. There are three periods, 0, 1 and 2. Banks lend money to the developers. The developers buy land and build houses, or alternatively, banks buy land and hire developers to build houses. There are three types of developers: fundamental or informed, parasitical or looters, and uninformed or copycats, as AR call them. Looters buy land in period 1 (pumping up the land price) and sell in period 2 (dumping land and depressing prices). Fundamental developers are always in the market. Copycat developers are feedback or momentum traders, who rely on price dynamics to infer the true value of land. Land supply is controlled by local authorities controlling zoning regulations or selling long-term leases. Developed properties are purchased by households. The land supply is homogeneous and a certain number of parcels of land is needed to build a house (i.e., the production function is linear in land, and land is the only input). There is a homogeneous retail demand for houses by households and a heterogeneous supply from the three types of developers. Some houses are built by fundamental builders. Some by copycat builders, and some by looters.

[7] "*A looting strategy amounts to a sophisticated version of having a limited liability corporation borrow money, pay it into the private account of the owner, and then default on its debt.*", AR p.5.

[8] The 2022 spectacular FTX bankruptcy in the crypto market, the 2007-08 Subprime Mortgage crisis, the Italian corporate bond market scandal in the early 2000s can all, in principle, be framed in similar manner.

Uninformed developers buy overvalued land from the government or from looters in period 2. Looting developers exploit uninformed ones by pumping up the land price in period 1 and dumping in period 2. These developers are looters in the sense that their private wealth gains are much smaller than the collective losses inflicted on the honest momentum builders, the inefficient land and house supply dynamics, and the excess land and house price volatility that affects all agents.

Consider now an equity market with looters. Stock investors are heterogeneous. Retail investors are uninformed momentum traders, fundamental investors are informed, and as before looters buy in period 1 and sell in period 2. Equity issuers are firms. Here the supply of equity capital (demand for equity funding) is homogeneous. The demand side is heterogeneous. How is the pump-and-dump trader a looter in the stock market? These buyers of stocks use leverage from intermediaries to buy stocks. Under limited liability, they can borrow up to the limit allowed by the government with banks lending them more than the value of the asset. So they leverage more than the value of their portfolio, knowing that they will be bailed out by the government when the price falls.

AR developed a microfunded model of financial looting as characterized above. In a stylized asset pricing model that captures the critical features of their structural model, they then study the boom-bust in land prices in Dallas (TX) in the early 1990s. In particular, they show how the exogenous entry into the land market of a small mass of looting developers can trigger the development of a bubble in land prices and building activity whose bursting costs is borne by honest but uniformed developers, who fail to understand the source of the price increase during the boom phase. They do so in a simple, *rational expectation* asset price model with feedback trading and *exogenous* looter entry.

In the next section, we develop a similar model of a domestic asset market in which the prevalence of looting is *endogenous* rather than exogenously given as in AR, leading to excess asset price volatility relative to the equilibrium without looting as in Brunnermeier, Sockin, and Xiong (2021). We then use this model to evaluate the impact on the prevalence of financial looting of controls on resident capital outflows and heterogeneous domestic regulatory penalties. In our setting, the government leans against looting through a policy regime in which it is costly for all residents to move funds abroad, and regulatory penalties are individual-specific. In our setting, looters running out of the country is akin to bankruptcy for profits, as once funds are transferred abroad, they are beyond the government's jurisdiction. By assumption, because of weak institutions, the government cannot impose uniformly implemented domestic regulatory penalties on looters, which would otherwise quash the looting practice and diminish the incentive to impose outflow controls.

Even though the welfare analysis is not micro-funded, it is in the spirit of the new theoretical literature on capital controls in which macroprucential and capital controls policies are second-best interventions that take the underlying frictions as given and not removable. As in AR, therefore, the first-best in which looting is eliminated by improving institutional quality and imposing homogenous regulation is not attainable by assumption. However, unlike AR, for tractability, we work in an exchange economy in which the supply side of the market and the fundamental value of the asset do not depend on looting prevalence. This allows us to generate strong illustrative results but prevents us from fully formulating optimal policy recommendations.

3 The Model

In this section, we set up a tractable model of a domestic asset market with endogenous looting, similar to Akerlof and Romer (1993), De Long et al (1990), and Brunnermeier et al (2022). As we discussed in the previous section, this could be the housing market or the stock market.

We first describe the model's environment and main assumptions. Next, we discuss the market clearing period-by-period. We then describe the policy regime and discuss the three choices faced by looters: (1) no looting; (2) looting and staying in the country, and (3) looting and fleeing the country, thereby placing the looted resources beyond the government's jurisdiction. Finally, we present the market equilibrium in terms of asset prices and quantities demanded by each agent.

3.1 Environment and assumptions

There are four periods in the model, $t = 0$, 1, 2, and 3, and three types of investors in the market: fundamental investors, naïve investors, and looters.

Fundamental investors know the true value of the asset, A, and have the following demand function, D_t^f, in each period t:

$$D_t^f = A - P_t, \tag{1}$$

where A reflects the true asset value, and P_t is the asset price at time t. Fundamental investors buy low and sell high. Their trading behavior is similar to that of the rational informed speculators in Delong et al. (1990) and the informed investor in AR or Brunnermeier et al (2022). Their presence tends to stabilize the market. We assume that fundamental investors face limits to arbitrage as in Shleifer and Vishny (1997), so that their trading will not necessarily equalize the market price with the fundamental value period by period.

Naïve investors are momentum traders similar to the "positive feedback" investors in Delong et al. (1990), the "copy-cat" traders in AR or the retail investors in Brunnermeier et al (2022). They buy the asset when the price increases from the previous period and sell it when the price drops. They do not know the true value of the asset, A, so they are uninformed. Unlike the copycat traders in AR, they have biased expectations about A.[9] We interpret naïve investors as honest but uninformed developers in the housing market as in AR. Their demand D_t^n in period t is

$$D_t^n = \beta \left(P_{t-1} - P_{t-2}\right), \tag{2}$$

with $\beta > 1$. Here, β is the sensitivity of the representative naïve investor to price changes, reflecting the weight of the aggregate demand of naïve traders in total asset demand. In practice, assuming that $\beta > 1$ is reasonable provided that there is a sufficiently large number of naïve traders in the market.

As in AR, we model looters as "pump-and-dump" traders. Critically, the presence of looters and their actions are unknown to naïve traders. Looters buy the asset at $t = 1$ and

[9] In AR, the copycat investors infer the true value of the assets from the market price dynamics and have rational expectations, but their market entrance is exogenous. In our setting, momentum traders do not have rational expectations, and the implied estimate of the true asset value is biased, but their entrance is endogenously determined.

sell it at $t = 2$. Their demand is denoted D_t^l and will be solved in equilibrium, while in AR their demand is exogenous.

For tractability, the asset is in fixed supply and does not depend on the actions of the looters:

$$S_t = B, \tag{3}$$

for all t. It is possible to accommodate an upward-sloping supply function, but doing so would scarify the possibility to derive analytical results. As we will explore below, in this simplified context, the government's objective is solely to minimize the magnitude of the looter mass and the associated asset price volatility.[10]

We note, finally, that there are no foreign traders in the domestic asset market. Therefore, there is also no capital inflow into this economy.

3.2 Market clearing

In each period, market clearing requires:

$$D_t^f + D_t^n + D_t^l = S_t. \tag{4}$$

So we now describe the demand of each agent period by period.

Period 0

In period 0, there are only fundamental investors in the market, with demand D_0^f equal to $A - P_0$. Naïve investors are not in the market as there is no prior change of price. Looters have not entered the market, so their demand D_0^l is 0 as well. Market clearing is:

$$A - P_0 + 0 + 0 \ = B \tag{5}$$

[10]The supply of land could also depend on lagged price dynamics, as it does in practice. This can deliver a rich set of implications for the persistence of the bubble burst due to the distortion induced on the supply side of the market.

and the equilibrium price is

$$\hat{P}_0 = A - B. \tag{6}$$

Period 1

In period 1, fundamental investors have a demand of D_1^f equal to $A - P_1$. Naïve investors continue to stay out of the market as there is no prior price change. Looters enter the market with a demand D_1^l that we determine later. Market clearing implies

$$A - P_1 + 0 + D_1^l = B, \tag{7}$$

and the equilibrium price is

$$\hat{P}_1 = A - B + D_1^l. \tag{8}$$

Period 2

In period 2, fundamental investors have a demand of D_2^f equal to $A - P_2$. Naïve investors enter the market with demand D_2^n equal to $\beta\left(\hat{P}_1 - \hat{P}_0\right)$, as they observe the price change from period 0 to 1. The looters exit the market, so $D_2^l = 0$.[11] Market clearing is:

$$A - P_2 + \beta\left(\hat{P}_1 - \hat{P}_0\right) + 0 \; = B. \tag{9}$$

Substituting for $\left(\hat{P}_1 - \hat{P}_0\right)$, we thus have:

$$\hat{P}_2 = (A - B) + \beta D_1^l. \tag{10}$$

The looters' demand in period 1 affects the market price in period 2 even though looters leave the market because naïve investors' demand depends on the market price in the previous periods. Looters, therefore, exploit the naïve investor behavioral bias. In other words, in this market, looters engineer resource extraction from naïve investors as in Akerlof and Romer

[11]The demand of looters reflects their total holding of the asset. Transitioning from a positive to zero gross holding implies that the looters are divesting the asset in period 2.

(1993).

Period 3

In period 3, the true value of A becomes public information.[12] Fundamental investors continue to demand D_3^f equal to $A - P_3$. Naïve investors' demand, D_3^n, is assumed to revert to 0 as the value of A becomes publicly known. The looters will also have a zero demand of D_3^l. Market clearing in period 3 is:

$$A - P_3 + 0 + 0 = B \tag{11}$$

and the market price reverts to its fundamental value, as in period 1:

$$\hat{P}_3 = A - B. \tag{12}$$

Relative to an equilibrium without looters, this market features a boom-bust cycle and excess asset price volatility driven by the looters' demand in period 1, D_1^l. Moreover, if naïve investors were leveraged, the looters' exit could push them against the leverage constraints and trigger firesales, causing the asset prices to fall below fundamental values.

3.3 The policy regime

As the asset is in fixed supply, looting does not affect its fundamental value. We assume that the government takes the behavioral biases of retail investors and the potential entry of financial looters as given, as in AR, and attempts to contain looting and the associated excess asset price volatility. The government's instruments are two. The first is an individual-specific regulatory penalty, ω_i, imposed if looters stay in the country that raises the cost (or lowers the profits) of looting in period 2. The penalty is idiosyncratic to reflect an individual's ability to avoid regulation enforcement and sanctions through lobbying, connectedness, and corruption. Thus, it represents a weak institutional capacity to uniformly enforce the rule of law. As we shall see below, when the regulatory penalty is homogeneous, the scope for outflow controls on residents is greatly diminished, albeit not completely eliminated in our

[12]In a housing market, for example, the true value of A may reveal itself through persistent high vacancy rates.

setting.

The second instrument is a capital control policy on resident outflows that makes it costly to transfer funds abroad. We assume that looters can avoid their domestic penalty by moving funds abroad or relocating. However, a de jure regime of controls on resident outflows makes it costly to do so. In practice, these controls typically take the form of outright prohibitions, limits, or quotas on the outflow size, as in China, holding period requirements, as in Chile in the 1990s, or sometimes taxes, as in Brazil in the 2000s. Transaction quotas require a resident to orchestrate multiple transfers to circumvent controls. For example, in China, households can freely move money abroad below the annual 50k quota, and reportedly rely on their family and social network to circumvent this limit, incurring various costs. Similarly, a holding period results in an opportunity cost equivalent to the foregone return differential. Relying on cryptocurrency exchanges or setting up shell companies in offshore financial centers also entails transaction and legal costs over and above normal intermediation fees, which are assumed zero for simplicity.

Like the domestic penalty, the cost of transferring funds abroad to evade or elude the regime of outflow controls is also assumed to be heterogeneous across potential looters to reflect a trader's ability to choose the specific manner in which to circumvent them. However, for analytical tractability, we assume a different functional form than the domestic penalty. Specifically, the capital control policy instrument has two components: a common component ϕ that is a percentage of the sale price and an additive idiosyncratic cost, η_i, which reflects the individual ability to minimize such transaction costs. The main prediction of the model would remain valid if we directly assume that ϕ is idiosyncratic and eliminate the additive fix component ν_i. What is necessary to reduce looting ex-ante is to introduce a trade-off between the costs of evading or eluding the domestic regulatory penalty and the cost of avoiding the outflow restrictions. Indeed, even though the cost is modeled on the sale price, this effectively also increases the cost of (or reduces the profits from) looting. As we discuss below, a completely open capital account lowers these costs to zero and eliminates the trade-off. We interpret ϕ as the implicit tax on the asset sale price that all traders would have to pay to move funds abroad, or the average strength of the outflow controls in the economy. We interpret the idiosyncratic component η_i, which is independent of the amount of money transferred, as reflecting the additional individual-specific preferences or ability to access a specific transaction technology. We further assume that the government controls ϕ and the boundaries of the distributions of η_i and ω_i. However, the effective implementation and enforcement of these policies are subject to capacity constraints reflected in the assumed heterogeneity of the additive component of the cost.

One more remark is in order here. We assume that all residents, including fundamental traders, naïve traders, and looters, bear the same cost ϕ for transferring money abroad. However, fundamental and naïve investors, by nature, do not engage in looting and thus do not face domestic penalties. Consequently, in the absence of a diversification motive or a return differential with foreign assets—which are not considered in this model—staying in the country remains the dominant strategy for these types of investors. In other words, naïve and fundamental investors have no incentive to flee, as they are not at risk of domestic penalties. On the other hand, looters face a trade-off between the domestic penalty and the cost of evading capital controls. As a result, looters' capital outflows are not driven by traditional motivations such as diversification, liquidity needs, or superior risk-adjusted returns. Instead, their actions are primarily motivated by the desire to evade domestic penalties for market manipulation, which can reduce welfare by exploiting uninformed investors, leading to boom-bust cycles and excessive asset price volatility in domestic markets.

In practice, outflow controls are costly. One could introduce the distortionary and diversification costs imposed by outflow controls on the economy as a fixed implementation cost for the government, as we do when we discuss a simple welfare function below.

3.4 Equilibrium prices and looters' asset demand

We now discuss the determination of the asset demand from looters in period 1, D_1^l, and the equilibrium asset price in periods 1 and 2. We first determine the equilibrium mass of looters taking P_1 and P_2 as given. We then jointly solve for equilibrium P_1, P_2 and D_1^l through equations (8), (10), and the relevant expression for D_1^l taking into account the boundary conditions imposed by the policy regimes.

3.4.1 Looters' payoffs and behavior

Assume that we have a unit mass of potential looters, indexed by i. Given the incentives provided by the policy regime, depending on their individual expected profit, looters must decide whether to loot and pay the penalty to stay in the country, to run away and pay the costs associated with circumventing capital controls, or staying out of the market and not looting.

The profit of looter i who stays in the country and pays the penalty is

$$\pi^i_{stay} = (P_2 - P_1)(1 - \omega_i) \,. \tag{13}$$

As noted earlier, the penalty rate ω_i is individual-specific to account for the unique circumstances of each looter and reflects the assumed inability of the government to enforce laws and regulations uniformly across agents. This includes factors such as their level of political influence and connectedness with regulators or the heterogeneous cost of a legal defense.[13] Without loss of generality, we assume that ω_i is uniformly distributed between $[0, \bar{\omega}]$. When $\omega_i = 0$, the looter can keep all profits from speculation in period 1. When $\omega_i = 1$, the looter is expropriated of all profits. The looter incurs a loss when $\omega_i > 1$.

To avoid the domestic penalty, looters can leave the country by paying a uniform cost of circumventing outflow restrictions, ϕ, on their sale price. Running looters also face an individual-specific, additive cost reflecting the specifics of the international transaction technology they access, the currency denomination of choice, or the relocation destination. Thus, looter i's profit from running away is

$$\pi^i_{run} = (P_2 (1 - \phi) - P_1) - \eta_i, \tag{14}$$

where η_i is the individual-specific component of the cost. Again, without loss of generality, we assume that η_i has a uniform distribution over $[0, \bar{\eta}]$.

Based on the relative magnitude of π^i_{stay} and π^i_{run}, looter i may take one of the following

[13] In countries where institutions are weak and with a lack of enforcement capacity, the effective penalty faced by each looter may differ even when the nominal penalty is uniform.

three actions, x_i:

- (i) $x_i = 0$, i.e., no looting at $t = 1$;
- (ii) $x_i = 1$, i.e., looting at $t = 1$ and staying in the country at $t = 2$;
- (iii) $x_i = 2$, i.e., looting at $t = 1$ and running away at $t = 2$.

The looter i's decision, x_i, depends on the following conditions:

$$x_i = \left\{ \begin{array}{c} 0 \text{ if } \pi^i_{stay} \leq 0 \text{ and } \pi^i_{run} \leq 0 \\ 1 \text{ if } \pi^i_{stay} \geq \pi^i_{run} \text{ and } \pi^i_{stay} > 0 \\ 2 \text{ if } \pi^i_{stay} < \pi^i_{run} \text{ and } \pi^i_{run} > 0 \end{array} \right\}. \tag{15}$$

3.4.2 Looters' decisions and the policy regime

When are the conditions above satisfied? And which fraction (or mass) of potential looters enters the market given the incentives provided by the policy regime and the asset prices? To start answering these questions, note that:

$$\pi^i_{stay} > 0 \quad \Leftrightarrow \quad \omega_i < 1. \tag{16}$$

Similarly,

$$\pi^i_{run} > 0 \quad \Leftrightarrow \quad \eta_i < \left(P_2\left(1-\phi\right) - P_1\right). \tag{17}$$

Last, given (13) and (14), we have that

$$\pi^i_{stay} < \pi^i_{run} \quad \Leftrightarrow \quad \omega_i > \frac{P_2\phi + \eta_i}{P_2 - P_1}. \tag{18}$$

Condition (18) states that if the individual penalty ω_i, which can be larger than 1, is greater than a certain threshold, the looter i will run away rather than staying once she/he engages in looting. And if a looter runs away, the penalty must be larger than this threshold.

With a large enough penalty, we can also have that for some looters, $\pi^i_{stay} < 0$. On the other hand, with a high enough capital outflow tax ϕ, it is possible that $\pi^i_{run} < 0$. It follows that, in a regime in which both the cost of evading outflow controls and penalties for illegal financial activities are high enough, both $\pi^i_{stay} < 0$ and $\pi^i_{run} < 0$, and looter i will not speculate in period 1. This raises the possibility that an appropriate level of ϕ may not only decrease outflows of looted capital in period 2, but also dampen looting activity ex-ante in period 1, thus removing this specific source of capital outflow. As a result, $\hat{P}_1$ and $\hat{P}_2$ also decline, driving π^i_{run} and π^i_{stay} further into negative territories, potentially dissuading even more looters from entering the market in period 1. This feedback loop will persist until the market reaches its equilibrium. To analyze this possibility, we now fully solve the model.

3.4.3 Equilibrium

In the model, equilibrium asset prices in period 1 and 2 depend on the fraction of agents that choose to loot, while the equilibrium fraction of looters in period 1, in turn, depends on asset prices and the boundaries of the policy regime that are a function of ϕ, $\bar{\eta}$, and $\bar{\omega}$. In particular, the decision rule of looter i depends on the position of agent i relative to the boundaries conditions, which in turn depend on $\bar{\omega}$ and $\bar{\eta}$, given the assumed distribution for ω_i and η_i. Therefore, we first derive the equilibrium mass of looters for given asset prices and the limits of the parameter space in Appendix A. We then solve simultaneously for the equilibrium mass of looters and the equilibrium prices. We summarize the equilibrium of the model with the following proposition whose proof is in Appendix B. Readers who are not interested in the construction of the equilibrium can skip Appendix A and B.

Proposition 1. *Equilibrium Looting Mass and Asset Prices.* In equilibrium, the looters' demand is

(19)

$$\tilde{D}^l_1 = \left\{ \begin{array}{c} \frac{1}{\bar{\omega}} \text{ if } \phi \geq \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > \left(\left(1+\beta\right)\left(1-\phi\right)-2\right) \\ \frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)} \text{ if } \phi < \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > \left(\left(1+\beta\right)\left(1-\phi\right)-2\right) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq \left(\left(1+\beta\right)\left(1-\phi\right)-2\right) \end{array} \right\},$$

and the period 1 and 2 asset prices are:

$$\tilde{P}_1 = 1 + \tilde{D}_1^l, \tag{20}$$

$$\tilde{P}_2 = 1 + \beta \tilde{D}_1^l. \tag{21}$$

Proof See Appendix B.

This proposition summarizes the joint determination of the share of looters in period 1 and the asset prices that clear the market in period 1 and 2 depending on the values of the tax on capital outflows and the relocation cost and the upper bounds on the individual regulatory penalty. The next section presents and discusses its normative implications and some model extensions.

4 Outflows Controls, Domestic Regulation, and Looting

We now discuss some properties of the model equilibrium, including the roles and the effects of outflow controls and domestic regulation in this setting.

4.1 The effects of preemptive outflow controls

The common component of the cost of circumventing capital controls, ϕ, has two effects. First, a higher ϕ induces more agents who looted to stay in the country rather than run away in period 2 by affecting the relative profitability of staying vs running away in (18) through $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$. Second, and more importantly, ϕ can also affect $\tilde{D}_1^l$ in period 1, and hence the fraction of agents who decide to loot.

To see the second effect, consider the equilibrium level of looting in period 1, $\tilde{D}_1^l$ in Equation (19). In equilibrium, $\tilde{D}_1^l$ increases from $\frac{1}{\bar{\omega}}$ in the first branch of (19), to $\frac{\bar{\eta}-(\bar{\omega}-1)\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1)(\beta-\beta\phi-1)}$ in the second branch, reaching a maximum of 1 in the third branch. As ϕ increases, $\tilde{D}_1^l$ may continue to be determined in the same branch of the solution or move down one or two branches in which $\tilde{D}_1^l$ is smaller. If $\tilde{D}_1^l$ was originally determined in the third branch, a higher ϕ makes the boundary condition of $\bar{\eta} \leq ((1+\beta)(1-\phi)-2)$ less likely to hold, pushing $\tilde{D}_1^l$ down to be determined in the second or first branch of the solution with ϕ above certain thresholds. If $\tilde{D}_1^l$ was originally determined in the second branch, then a higher

ϕ makes the boundary condition of $\phi < \frac{\beta-1}{\bar{\omega}+\beta}$ less likely to hold, pushing down $\tilde{D}_1^l$ to be determined in the first branch when ϕ is set above a certain threshold. If $\tilde{D}_1^l$ was originally pin-down by the first branch, then a higher ϕ will not shift $\tilde{D}_1^l$ to the second or third branch, and the equilibrium share of looting stays constant at its minimum value.

As a result, $\tilde{D}_1^l$ will remain the same or decrease with higher ϕ, as ϕ affects either the equilibrium mass of looters or the boundary conditions or both. Furthermore, as $\tilde{D}_1^l$ decreases with ϕ, so do the equilibrium asset prices $\tilde{P}_1$ and $\tilde{P}_2$. Therefore, a higher ϕ discourages the participation of looters in period 1 and reduces price volatility in all periods, both effects that are desirable in our simple setting.

Note also that, when $\tilde{D}_1^l = \frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)}$, we have

(22)
$$\frac{\partial \tilde{D}_1^l}{\partial \beta} = \frac{(\bar{\omega}-1)(\bar{\eta}-(\bar{\omega}-1\ )\phi)(1-\phi)}{(\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1))^2},$$

and

(23)
$$\frac{\partial^2 \tilde{D}_1^l}{\partial \beta \partial \phi} < 0.$$

This shows that, as β increases— i.e., if the prevalence of uninformed traders increase as captured by a higher sensitivity of the naïve trader to price changes, the depressive effect of ϕ on looting and volatility will be stronger. In other words, with more naïve investors, making resident outflows more costly can have a greater containing effect on looting and asset price volatility.

4.2 Ex-ante vs ex-post outflow controls

In the model, the capital control tax is announced ex-ante, so that looters can take it into account in period 1. In contrast, if looters only know about the tax in period 2, outflow controls cannot reduce looters' asset demand D_1^l in period 1. The ex post announcement cannot affect P_1 and P_2 either.

To see this, consider the case in which the tax rate ϕ is announced only ex-post in period

2. The equilibrium mass of looting $D^l_{1,post}$ obtained by setting $\phi = 0$ in (19) becomes:

$$D^l_{1,post} = \left\{ \begin{array}{c} \frac{\bar{\eta}}{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\ )(\beta - 1)} \text{ if } \bar{\omega} > 1 \text{ and } \bar{\eta} > (\beta - 1) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta}\ \leq (\beta - 1) \end{array} \right\}. \tag{24}$$

An ex-post outflow control intervention can limit period 2 capital flight, but we can see from (24) that it cannot affect the equilibrium mass of looting in period 1, i.e., $\frac{\partial D^l_{1,post}}{\partial \phi} = 0$. As a result, when outflow controls are imposed only ex post, they need to be stronger to accomplish the same reduction in capital flight in period 2.

To see this, consider, for example, the minimum level of ϕ needed to have $\pi^i_{run} \leq 0$ for all i, i.e., no capital outflow. That is, $\phi_{\min} = \frac{P_2 - P_1}{P_2}$. When ϕ is announced ex ante,

$$\phi_{\min, ex-ante} = \frac{\beta - 1}{\bar{\omega} + \beta}. \tag{25}$$

In contrast, if ϕ is announced ex-post, then

$$\phi_{\min, ex-post} = \frac{(\beta - 1)\,\bar{\eta}}{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\ )\,(\beta - 1) + \beta\bar{\eta}}. \tag{26}$$

Assume now for the sake of exposition, $\bar{\omega} = 2$, $\beta = 2$, and $\bar{\eta} = 0.5$. Then, $\phi_{\min, ex-ante} = 0.25$ while $\phi_{\min, ex-post} = 0.5$. So the ex-post capital outflow tax needs to be twice as large as its ex-ante implementation to fully prevent any capital flight. Again, the reason why preemptive outflow controls can be more effective than outflow controls for this specific purpose is that they can deter looting behavior in period 1.

4.3 A simple welfare rationale for outflow controls

We now discuss the optimal level of outflow controls from the government perspective. Consider the following simple social welfare function:

$$\Psi = (\min[P_t] - \max[P_t]) - c\phi. \tag{27}$$

The first component, $(\max[p_t] - \min[p_t])$, captures the idea that asset price volatility is welfare reducing in an exchange economy. A microeconomic justification for this component can be the assumption that all market participants have constant absolute risk aversion utility over asset returns, as in Brunnermeier, Sockin, and Xiong (2022). In that setting asset price volatility reduces the overall welfare of an exchange economy. The second component of the welfare function, $-c\phi$, simply captures the economic losses stemming from a higher ϕ. These can originate from the losses of risk-sharing and diversification opportunities, as well as possibly superior and safer investment opportunities available abroad when other traders who are not looting are also prevented from moving capital freely abroad.

Based on equations (6) and (21), we have that $\min[P_t]$ is $\hat{P}_0$, and $\max[P_t]$ is $\tilde{P}_2$. Hence,

$$(\min[P_t] - \max[P_t]) = -\beta \tilde{D}_1^l. \tag{28}$$

As $\frac{\partial \tilde{D}_1^l}{\partial \phi} \leq 0$, the government will have incentive to increase ϕ to reduce asset price volatility. The government will then pick a value of $\tilde{\phi}$ that maximizes Ψ. The optimal value depends on the parameters of β, $\bar{\omega}$, $\bar{\eta}$ and c. As a higher β increases the equilibrium mass of looters, the government will need to set a higher value of $\tilde{\phi}$ to maximize social welfare.

We now examine how domestic regulation affects asset price dynamics and equilibrium looting in period 1 as well as how it may interact with outflow controls.

4.4 Homogeneous domestic regulation

We now illustrate the sense in which heterogeneous implementation and enforcement of domestic regulation create scope for using controls on residents' outflows. In our baseline model, we have assumed that due to weak institutional capacity, the ω_i penalty imposed if looters elect to stay in the country is individual-specific, reflecting individuals' ability to deal with the local regulatory and judicial environment. Here, to illustrate the importance of the assumed heterogeneity, we compare the setting with the case in which the government is able to enforce a homogenous $\omega_i = \bar{\omega}$, and all looters face the same consequence if they choose to stay.

When $\omega_i = \bar{\omega}$ for all i, it is possible to show that the mass of looters in period 1 is either zero or one as summarized below:

$$\tilde{D}^l_{1|\omega_i=\bar{\omega}} = \left\{ \begin{array}{c} 0 \text{ if } \phi \geq \frac{\beta-1-\eta}{\beta+1} \text{ and } \bar{\omega} \geq 1 \\ 1 \text{ if } \phi < \frac{\beta-1-\eta}{\beta+1} \text{ and } \bar{\omega} \geq 1 \\ 1 \text{ if } \bar{\omega} < 1 \end{array} \right\}. \tag{29}$$

In this case, a positive ϕ is still needed to obtain $\tilde{D}^l_{1|\omega_i=\bar{\omega}} = 0$. However, compared with $\tilde{D}^l_1$, the period 1 looting mass $\tilde{D}^l_{1|\omega_i=\bar{\omega}}$ is now much smaller compared to the heterogenous case. For example, if $\beta = 2$, $\bar{\omega} = 1.1$, $\eta = 1.1$, and $\phi = 0.1$, then $\tilde{D}^l_{1|\omega_i=\bar{\omega}} = 0$ compared with $\tilde{D}^l_1 = 0.96$ when the penalty is a heterogenous penalty. Therefore, a more effective enforcement of government regulation (i.e., the ability to enforce the penalty for looting more homogeneously in our setting) helps to curtail looting and strongly reduce the need for outflow controls in this setting, consistent with our observation in the introduction that government effectiveness is empirically associated with the prevalence of controls on capital outflows of residents.

5 Looting Prevalence and Outflow Control Effectiveness

In this section, we discuss the quantitative relevance of financial looting underlying our theory and investigate the extent to which countries with more stringent policies in place on resident outflows are less vulnerable to it as predicted by our simple model. We first discuss some anecdotal evidence and then provide more systematic albeit less direct evidence based on a fixed-effect panel data model for housing price boom-bust cycles.

5.1 How salient is financial looting, and to what extent does it drive outflows?

How prevalent is the type of speculation and looting in our model? Although the evidence is only anecdotal, it is abundant. In a series of case studies on the 1990s US Savings&Loans Crisis and other housing boom-bust episodes in developing countries, AR find that financial looting was pervasive in the 1980s and the 1990s. Subsequent notable cases are the Southeast and East Asian asset bubbles prior to 1998 that were ultimately rooted in major failures of corporate governance and banking regulation (e.g., Quigley 2001 and Collyns and Senhadji

2002). The US Subprime crisis in the late 2000s and the Crypto debacles in the early 2020s are also plagued by examples of financial misconduct at the expense of retail investors, vividly illustrating that financial looting may be present even in the most institutionally developed economies.

A specific example is the recent real estate boom in China, which took place in the context of a process of significant domestic financial liberalization and gradual opening of the capital account. During the late phase of the real estate boom, in 2020, developers engaged in real estate speculation by borrowing from banks based on overstated collateral valuations to buy land from local governments to build and sell to households pre-paid apartments at frothy valuations (Reuters, 4/16/2021). The expectation of ever-rising property values fueled this speculative bubble (Financial Times 1/5/2023). According to the New York Times (6/20/2022), "*when a property in Shenzhen became available in March 2020, the building's 288 units sold out online in seven minutes*".Regulators eventually attempted a crackdown on borrowing with dubious collateral (SCMP 1/31/2021). Major developers like Evergrande, Country Garden, and many others, burdened with enormous debts, began to default in 2021. Evergrande alone had debts exceeding $300 billion, and its inability to meet obligations triggered widespread economic fallout. Many developers went bankrupt, leaving behind so many unfinished projects that a former senior official remarked, "*even China's 1.4 billion population can't fill all its vacant homes*" (Reuters, 24 September 2023), forcing the government to pick up the tab.

Which portion of total capital outflows may be represented by flows driven by looting, leaving the country legally or illegally to evade domestic penalties as opposed to normal economic diversification or precautionary acquisition of liquidity buffers in foreign currency? While a direct quantification is difficult, the available evidence suggests that, in general, the magnitude of illicit financial flows may be substantial, posing particular harm to saving rates in poor countries.[14] For instance, Alstadsæter, Johannesen, and Zucman (2018) report that approximately 10 percent of the global GDP is held in tax havens, with significant variations observed across regions. Gulf countries and some Latin American economies, in particular, exhibit proportions as high as 60 percent of their GDP being held in tax

[14]See Brandt (2023) for a survey.

havens. Another concerning trend identified by Andersen, Johannesen, and Rijkers (2022) is the correlation between aid disbursements to poor countries and significant increases in bank deposits in offshore financial centers known for their practices of bank secrecy and private wealth management. Their findings indicate that approximately 7.5 percent of the aid provided is redirected to offshore bank accounts.

We now turn to investigate these questions more formally within the context of residential housing markets and examine whether restrictions on resident capital outflows can help contain them, as predicted by our simple model."

5.2 Housing Prices, Offshore Bank Deposits, and Outflow Controls

Our model broadly predicts that looters may move profits abroad during the late phase of a housing price boom in an attempt to avoid possible domestic penalties associated with financial misconduct, subsequently triggering a burst that leaves retail investors and the government bearing the brunt of the economic costs associated with the down phase of the cycle. Our model also predicts that stricter control measures should deter capital outflows driven by looting.

The strategy in the empirical analysis follows Andersen at al. (2022), who studied the phenomenon of elite capture of foreign aid by examining the correlation between aid disbursements and increases in bank deposits in offshore financial centers in countries with more secretive banking systems (labelled haven deposits).

We first document that higher real house price changes are associated with higher offshore deposits to haven countries. We then show that such correlation is much lower where the controls on resident outflows are tighter. We then narrow the focus on the late boom phase of housing price cycles followed by a bust phase and check that the dynamics are different in booms that are not followed by busts. Next, as a placebo test, we also repeat the analysis for late booms not followed by busts and repeat the analysis for profits in the non-financial corporate sector, which could display similar dynamics for tax elusion or tax evasion reasons. Finally, we repeat some of the steps in the analysis by looking at new incorporations in haven countries during periods of housing prices boom, which are even more aligned with specific strategies known to be used to circumvent outflow controls on residents.

Throughout the analysis, we used a panel fixed effect model, with the following specification:

$$(30)\quad \Delta \ln (Haven_{i,t}) = \lambda \Delta \ln (RHP_{i,t}) + \gamma \Delta \ln (RHP_{i,t}) * CFM_{i,t} + \delta CFM_{i,t} + u_i + u_t + \varepsilon_{it},$$

where $Haven_{i,t}$ is the stock of haven deposits owned by country i at year t. As in Andersen et al. (2022), "Haven deposits" refer to off-shore deposits in countries, in which the legal framework provides more secrecy and asset protection. $\Delta \ln (Haven_{i,t})$ is the annual change of the log of $Haven_{i,t}$. $RHP_{i,t}$ is a real housing price index in country i in year t. $\Delta \ln (RHP_{i,t})$ is the annual change in the log of $RHP_{i,t}$. $CFM_{i,t}$ is the capital outflow controls *on residents* in country i at year t. The regression also includes country and time-fixed effects, denoted u_i and u_t, respectively. The real housing price indices are historical series from Cesa-Bianchi et. al. (2015) till 2012, updated with BIS data from the residential property database thereafter. Off-shore deposits are from Andersen et al. (2022) till 2018 and updated with BIS locational banking statistics for cross-border deposits through 2022.

Capital controls data are from Fernandez et al. (2016). The specific indicator of restrictions on resident outflows is calculated as follows. We first sum over the restrictions on residents' foreign purchases across various assets, including equities, bonds, money market instruments, collective investments, derivatives, and real estate. We then take the square root of this sum to facilitate the creation of the capital control index on resident outflows. The final sample covers 37 economies spanning from 1990 to 2022 at the annual frequency. [15] The sample is expanded to 48 economies in robustness checks to include 11 non-haven countries as defined in Andersen et al. (2022).[16]

Our model broadly predicts that $\lambda > 0$ if looters move profits abroad to haven countries during periods in which housing prices increase, especially during the late phase of a housing boom that subsequently triggers a bust. Our model also predicts that $\gamma < 0$, as stricter

[15] The list of 37 economies include Austria, Bulgaria, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Germany, Greece, Hong Kong SAR, Hungary, Iceland, India, Indonesia, Israel, Italy, Korea, Latvia, Malaysia, Malta, Mexico, Morocco, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Romania, Russia, Singapore, Slovenia, South Africa, Spain, Thailand, and Türkiye.

[16] The list of 11 non-haven countries include Australia, Brazil, Denmark, Finland, France, Ireland, Japan, Netherlands, Sweden, United Kingdom, and United States.

control measures should deter capital outflows driven by looting.

5.2.1 Housing price changes

Table 1 presents the first set of estimation results. There is a statistically significant association between larger housing price changes and increased outflows to bank deposits in haven countries. In the absence of outflow controls, a one percent increase in housing prices is associated with 0.4 percent increase in deposit outflows to haven countries (Column 1 of Table 1). However, this effect is significantly tempered in the presence of capital controls on resident outflows. Moreover, in countries with the strictest capital outflow restrictions, housing price increases exhibit minimal impact on deposit outflows to haven countries. These patterns carry over when we control for country-fixed-effects (Column 2), year-fixed-effects (Column 3), and fundamental drivers of housing booms such as the real GDP growth (Column 4).

Table 1: Housing Prices and Offshore Bank Deposits to *Haven Countries*

Variables	**Baseline**	**Country effects**	**Year effects**	**GDP growth**
Housing Price Change	0.409***	0.384***	0.229*	0.207
	(0.128)	(0.132)	(0.129)	(0.137)
Housing Price Change*Capital Control	-0.217***	-0.219**	-0.182**	-0.183**
	(0.0831)	(0.0860)	(0.0817)	(0.0867)
Capital Control	-0.00728	-0.00646	0.000534	6.43e-05
	(0.00745)	(0.0132)	(0.0125)	(0.0129)
GDP growth				0.0755
				(0.134)
GDP growth*Capital Control				0.00515
				(0.0751)
Country FE	No	Yes	Yes	Yes
Time FE	No	No	Yes	Yes
Observations	996	996	996	996
R-squared	0.013	0.046	0.191	0.191

In contrast, Table 2 shows that there is no such association between housing price changes and deposit outflows to non-haven countries. In particular, the interaction term between housing price changes and capital controls on resident outflows is statistically insignificant in this case, for all considered specifications. The differential response of haven and non-haven deposits to house price changes is consistent with the broad prediction of our model, suggesting that capital outflows seeking to evade domestic regulatory penalties may target destinations that offer more secrecy and possibly more protection from prosecution for financial misconduct.

Table 2: Housing Prices and Offshore Bank Deposits to *Non-Haven* Countries

Variables	**Baseline**	**Country effects**	**Year effects**
Housing Price Change	0.240	0.253	-0.0583
	(0.161)	(0.167)	(0.169)
Housing Price Change*Capital Control	-0.116	-0.129	-0.0936
	(0.105)	(0.109)	(0.107)
Capital Control	-0.00673	-0.00371	0.00245
	(0.00937)	(0.0167)	(0.0163)
Country FE	No	Yes	Yes
Year FE	No	No	Yes
Observations	996	996	996
R-squared	0.003	0.020	0.115

5.2.2 Housing price boom-bust cycles

Our model suggests that capital outflow from looting is more likely to occur during the late boom phase of a boom-bust cycle in the housing market. We now examine this prediction in more detail. We define a boom (bust) period when the three-year moving average of the annual return is larger (smaller) than a threshold, as specified by the following equation:

$$\frac{(g_{i,t} + g_{i,t-1} + g_{i,t-2})}{3} \gtrless g \pm x\sigma \tag{31}$$

where $g_{i,t}$ is the year t real housing price log-change in country i, g is the average annual house price change across all periods and countries, σ is the standard deviation of the annual return across all countries, and x is a scale parameter calibrated to capture most of the well-known boom-bust episodes while avoiding the inclusion of less recognized or implausible events. Specifically, consistent with our model, we focus on the two last years of the *boom phase* immediately preceding the bust episodes.

To define a boom dummy, we first identify the episodes of boom-bust of the housing market for all 37 economies from 1990 to 2022 by following the approach above. We then construct the boom dummy to represent the peak year and the two years leading up to the peak (i.e., t-2, t-1, and t, with t being the peak year). The regression specification adds to

Table 3: Housing Boom-Busts and Offshore Bank Deposits to *Haven Countries*

Variables	**(1)**	**(2)**	**(3)**
Housing Price Change*Housing Boom	1.300***	1.420***	1.395***
	(0.481)	(0.468)	(0.472)
Housing Price Change*Capital Control*Housing Boom	-0.594**	-0.718***	-0.708***
	(0.251)	(0.238)	(0.240)
Housing Price Change	0.145		
	(0.133)		
Housing Price Change*Capital Control	-0.138		
	(0.0874)		
Capital Control	0.00284	0.00138	0.00206
	(0.0125)	(0.0125)	(0.0129)
GDP growth			0.101
			(0.127)
GDP growth*Capital Control			-0.0192
			(0.0713)
Observations	996	996	996
R-squared	0.197	0.195	0.196

Table 4: Housing Boom-Busts and Offshore Bank Deposits to *Non-Haven Countries*

Variables	**(1)**	**(2)**
Housing Price Change*Housing Boom	0.0868	0.0327
	(0.632)	(0.615)
Housing Price Change*Capital Control*Housing Boom	0.0615	-0.0483
	(0.329)	(0.313)
Housing Price Change	-0.0618	
	(0.174)	
Housing Price Change*Capital Control	-0.111	
	(0.115)	
Capital Control	0.00235	0.00118
	(0.0164)	(0.0164)
Country FE	Y	Y
Year FE	Y	Y
Observations	996	996
R-squared	0.115	0.112

Equation (33) an interaction between this boom dummy and housing price changes, and a triple interaction between the boom dummy, housing price changes, and the capital control index. Table 3 reports the results.

In Column 1 of Table 3, we find that the interaction term between the boom dummy and the housing price change is significantly positive. During the last few years of the boom phase of the cycle, a one percent increase in housing prices is associated with a 1.4 percent increase in deposit outflows to haven countries. This association is much weaker when a country implements capital controls on resident outflows, as evidenced by the significantly negative coefficient for the triple interaction term of housing price change, capital control, and the boom dummy. In Column 2, we drop housing price changes and its interaction with capital control, and the results get stronger. In Column 3, we include the real GDP growth rate and its interaction with capital control, and again, the results from Column 2 hold.

Table 5: Housing Boom Without Bust and Offshore Bank Deposits to Haven Countries

	37 Cnts. Samp. 1	37 Cnts. Smpl. 2	48 Cnts. Smpl. 1	48 Cnnts. Smpl. 2
Housing Price Movement*Boom with Bust	1.483***		0.928**	
	(0.473)		(0.389)	
Housing Price Movement*Capital Control*Boom with Bust	-0.765***		-0.507**	
	(0.240)		(0.208)	
Housing Price Movement*Boom without Bust	0.711**	0.650**	0.468*	0.437*
	(0.320)	(0.320)	(0.265)	(0.266)
Housing Price Movement*Capital Control*Boom without Bust	-0.301	-0.287	-0.226	-0.219
	(0.208)	(0.209)	(0.190)	(0.190)
Capital Control	0.00550	0.00137	0.00127	-0.00113
	(0.0127)	(0.0127)	(0.0111)	(0.0110)
Country fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Observations	977	977	1,318	1,318
R-squared	0.200	0.190	0.185	0.181

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 reports the results for non-haven countries. In this case, the triple interaction of housing price changes, capital controls and the boom dummy is statistically insignificant (Column 1 of Table 4). Again, the comparison between capital flows to haven vs non-haven economies during the late phase of a housing boom preceding a bust is consistent with the predictions of our model.

Thus far, we examined booms followed by busts, as these align more closely with our model set up. Now, we turn our attention to episodes of housing booms that are *not followed* by busts, which are less likely to be influenced by the type of financial looting in our model. In Table 5, we add an interaction term for housing price movements with booms not followed by busts, as well as their interaction with capital controls, to the specification used in Column 2 of Table 3. In Column 1, the results show that the impact of booms without busts on outflows to haven banks is smaller compared to booms followed by busts. Moreover, the interaction between capital controls and booms without busts is not statistically significant. In Column 2, where we exclude booms followed by busts, the results from

Column 1 are largely maintained. In Column 3, we expand the sample from 37 economies to 48, incorporating 11 non-haven country as defined by Anderson et al. (2022), and replicate the specifications from Columns 1 and 2. The findings remain consistent with those in the earlier columns: the impact of booms followed by busts is more pronounced than that of booms without busts.

5.2.3 Corporate profits and deposit to haven countries

In this section we repeat the analysis on corporate profits of the non-financial corporate sector as a placebo test of our baseline findings. The logic is that if deposit outflows to haven countries during housing booms are driven by wealth effects and tax avoidance purposes, then larger corporate profits would also likely lead to more outflows to these banks.

Table 6: Corporate Profits and Offshore Deposits to Haven Countries

	(1)	(2)
Housing Price Change*Housing Boom	1.746***	
	(0.568)	
Housing Price Change*Capital Control*Housing Boom	-0.752***	
	(0.280)	
Capital Control	-0.00481	-0.0147
	(0.0156)	(0.0138)
Real Corporate Profits Change	-0.502***	-0.482***
	(0.111)	(0.105)
Real Corporate Profits Change*Capital Control	0.218***	0.197***
	(0.0561)	(0.0440)
Country FE	Y	Y
Year FE	Y	Y
Observations	650	717
R-squared	0.247	0.224

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

We, therefore, work with real profit changes as in Tables 1 and 2. Country-level data on non-financial corporate profits are from the OECD and the UN.[17] The regression specification adds to Equation (32) the percentage change in real corporate profits and its interactions with capital controls, where profits are deflated with the national CPI index. Table 6 reports

[17] Before proceeding, we identified boom-bust cycles in nominal profit growth, real profits growth, or profits as a share of GDP, and we find no evidence of such dynamics.

the results.

For countries with no capital controls, higher corporate profits are significantly associated with *lower* rather than higher outflows to banks in haven countries (Column 1). This clearly rules out that the documented associations in the housing markets share common driving forces, like tax motives, as corporate profits. A possible explanation of the different signs in the association is that corporate profits may be less subject to speculation and looting, as there is less involvement from naïve traders and looters. Additionally, higher corporate profits may encourage firm owners to invest more within the country, thereby reducing capital outflows. Also, in Column 1, for countries with more stringent controls, there is no significant association between corporate profits and outflows to haven countries. Reassuringly, the effects of the housing boom carry through. In Column 2, we exclude the housing price variables and retain only those related to corporate profits. Thus, Column 2 acts as a placebo test with corporate profits. Consistently, the pattern observed in Column 1 persists, with higher corporate profits linked to lower outflows to banks in haven countries.

5.2.4 Housing booms and new incorporation in offshore centers

In this section, we examine the behavior of new incorporations in offshore centers using the files published by the International Consortium of Investigative Journalists (ICIJ). The files cover the following the Panama Papers, Offshore Leaks, the Paradise Papers, and the Bahamas Leaks. Again, following Anderson et al (2022), we construct a variable called "Offshore open", which is the number of new openings of offshore corporations with links to country i in year t, as documented in the above reports, normalized by the one-year-lagged stock of offshore operations by country i. The sample covers the period from 1990 to 2017. Table 7 reports the results.

In our sample of 37 economies, we find that the coefficient for the housing boom is positive and significant at the ten percent level (Column 1). This suggests that during a boom period, more corporations are established in offshore centers. However, the negative interaction between the housing boom and capital controls is not statistically significant. In Column 2, we expand the sample to include the 11 non-haven economies as in Column 3 of Table 5, increasing the total to 48 economies. Here, we observe a more significant

Table 7: Housing Boom and Offshore Incorporation

	(1)	(2)	(3)
Housing Price Movement*Housing Boom with Bust	0.153*	0.215***	0.222***
	(0.0879)	(0.0666)	(0.0666)
Housing Price Movement*Capital Control*Housing Boom with Bust	-0.0617	-0.0929***	-0.0947***
	(0.0434)	(0.0352)	(0.0352)
Capital Control	0.00638***	0.00777***	0.00817***
	(0.00229)	(0.00204)	(0.00207)
Housing Price Movement*Housing Boom without Bust			0.0875*
			(0.0448)
Housing Price Movement*Capital Control*Housing Boom without Bust			-0.0393
			(0.0391)
Country fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Observations	684	945	945
R-squared	0.425	0.380	0.383

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

impact of a housing boom followed by a bust on the opening of new corporations in offshore centers. Additionally, the effect of capital controls becomes more pronounced. In Column 3, we further include periods of booms without subsequent busts. The results indicate that for booms without busts, the rate of incorporation in offshore centers is significantly lower compared to periods of booms followed by busts.

6 Conclusions

This paper proposes a theory in which preemptive controls on capital outflows of residents (also called preemptive capital outflow management measures or CFMs) complement weak domestic regulation in minimizing asset price volatility and boom-bust cycles in domestic capital markets.

In this setting, retail uninformed, naïve investors engage in positive feedback or momentum trading, while heterogeneous speculators called "looters" exploit naïve traders by "pumping and dumping" an asset in fixed supply, taking into account the regulatory regime: an individual-specific penalty, a cost to circumvent outflow controls, and a heterogeneous cost to relocate abroad. In equilibrium, preemptive controls on resident outflows reduce capital flight through two channels: (i) by making capital flight less profitable than staying in the country, and (ii) by curtailing speculation and financial looting ex-ante. Compared to ex-post outflow controls, preemptive resident outflow controls are more effective because they not only limit capital flight ex-post, but also reduce speculative activity ex-ante. The stabilizing effect of such controls is stronger when there is a larger share of naïve traders in the market.

The paper also provides provides strong empirical evidence that housing price increases are linked to higher deposit outflows to banks in countries with strict secrecy laws. However, this association is significantly reduced when a country enforces capital controls on resident outflows, aligning with our model's predictions. Additionally, the effects of housing price changes and capital controls are more pronounced during the final boom phase of a boom-bust housing cycle. Analyzing corporate profits in the non-financial sector, used as a placebo test, shows that higher profits are significantly associated with lower outflows to haven banks when capital controls are absent, suggesting that these outflows during housing booms are not mainly driven by wealth effects or typical tax avoidance. Furthermore, our examination of new incorporations in offshore centers reveals an increase during housing booms, especially when followed by busts. However, capital controls on resident outflows reduce the rate of new offshore incorporations, indicating that these controls can deter the creation of offshore entities intended to circumvent domestic regulations during periods of housing market volatility.

A Appendix: Looters' Mass and Boundaries Conditions

1.1 No Looting

Potential looters will not enter the market if their maximum profits from stay or run is negative, i.e., if $Max\left[\pi^i_{stay}, \pi^i_{run}\right] \leq 0$. This can occur in the following two scenarios: i) $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$ but $(P_2(1-\phi)-P_1) \leq \eta_i$, resulting in $\pi^i_{stay} < \pi^i_{run} \leq 0$; ii) $\omega_i < \left(\phi + \frac{P_1\phi+\eta_i}{P_2-P_1}\right)$ but $\omega_i \geq 1$, resulting in $\pi^i_{run} < \pi^i_{stay} \leq 0$.

Aggregating over these two scenarios, the portion of no speculation, Ω_{no}, will be the following:

Case 1 (large $\bar{\omega}$ and $\bar{\eta}$ with a small ϕ). In this case, $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi)-P_1)$, and $P_2(1-\phi) \geq P_1$. Here some looters will have a negative profit by loot-and-stay, while others will have a negative profit by loot-and-run. A potential looter will not loot if π_{stay} and π_{run} are both non positive. Given the independent distributions of ω_i and η_i, the share of no looting is thus given by

$$\Omega_{no} = \frac{(\bar{\omega} - 1)(\bar{\eta} - (P_2(1-\phi) - P_1))}{\bar{\omega}\bar{\eta}}. \tag{32}$$

Case 2 (large $\bar{\omega}$ and $\bar{\eta}$ with a large ϕ). In this case, $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi) - P_1)$, and $P_2(1-\phi) < P_1$. Here no looter will make positive profits from run due to high tax on capital outflows. Then whether a looter will loot depends on whether he could make a positive profit by stay. Given the distribution of ω_i, the share of no looting is thus given by

$$\Omega_{no} = \frac{(\bar{\omega} - 1)}{\bar{\omega}}. \tag{33}$$

Case 3 (small $\bar{\omega}$ or small $\bar{\eta}$). In this case, $\bar{\omega} < 1$ or $\bar{\eta} < (P_2(1-\phi) - P_1)$. Here every potential looter can make a positive profit by stay or run. Hence the share of no looting is

$$\Omega_{no} = 0. \tag{34}$$

When $\bar{\omega} < 1$, it will be always profitable to loot-and-stay, hence $\Omega_{no} = 0$. Similarly, when $\bar{\eta} < (P_2(1-\phi) - P_1)$, it will always be profitable to loot-and-run, hence again $\Omega_{no} = 0$.

1.2 Looting and Running Away

Potential looters will loot and run from the country if and only if the following two conditions are met simultaneously: (i) $\frac{P_2\phi + \eta_i}{P_2 - P_1} < \omega_i$, so that $\pi^i_{stay} < \pi^i_{run}$; and (ii) $(P_2(1-\phi) - P_1) > \eta_i$, so that $\pi^i_{run} > 0$. Aggregating over these ranges of parameters, we have the portion of loot-and-run as the following:

Case 1 (large $\bar{\omega}$ and small ϕ). In this case, $\frac{P_2\phi}{P_2 - P_1} < \bar{\omega}$ and $P_1 < P_2(1-\phi)$. Here the maximum penalty for looting is large enough that for some looters, it will be more profitable to run than stay. Moreover, the condition of $P_1 < P_2(1-\phi)$ ensures that some looters can make positive profits from run. The share of looters choosing to run is thus given by

$$\Omega_{run} = \int_0^{Min[\bar{\omega}(P_2-P_1)-\phi P_2,(P_2(1-\phi)-P_1),\bar{\eta}]} \int_{\frac{P_2\phi+\eta_i}{P_2-P_1}}^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{35}$$

In (35), we first integrate ω_i from $\frac{P_2\phi+\eta_i}{P_2-P_1}$ to $\bar{\omega}$, which is the region where $\pi^i_{run} \geq \pi^i_{stay}$ given η_i. We then integrate η_i from 0 to the minimum of $(\bar{\omega}(P_2 - P_1) - \phi P_2)$, $(P_2(1-\phi) - P_1)$, and $\bar{\eta}$. The threshold of $(\bar{\omega}(P_2 - P_1) - \phi P_2)$ for η_i ensures that ω_i is not integrated above $\bar{\omega}$. And the threshold of $(P_2(1-\phi) - P_1)$ for η_i ensures that there is a positive profit from running.

Case 2 (small $\bar{\omega}$, or large ϕ). In this case, $\frac{P_2\phi}{P_2-P_1} \geq \bar{\omega}$ or $P_1 \geq P_2(1-\phi)$. When $\frac{P_2\phi}{P_2-P_1} > \bar{\omega}$, it would always be more profitable to stay than run. And if $P_1 \geq P_2(1-\phi)$, there is no positive profitable from run. Hence,

$$\Omega_{run} = 0. \tag{36}$$

1.3 Looting and Staying

For looter i to stay, we need $\pi^i_{stay} \geq \pi^i_{run}$ and $\pi^i_{stay} > 0$, which in turn require $\omega_i \leq \frac{P_2\phi+\eta_i}{P_2-P_1}$ and $\omega_i < 1$, respectively.

To determine the share of looters who chose to stay, Ω_{stay}, we need to aggregate over the relevant boundaries of the parameter space. There are several cases, depending on the upper bounds of the distributions, $\bar{\omega}$ and $\bar{\eta}$.

Case 1 (Large $\bar{\omega}$ and $\bar{\eta}$). In this case, $\bar{\omega} > 1$ and $0 < (P_2(1-\phi) - P_1) < \bar{\eta}$. Here both the maximum penalty for looting and the maximum cost of running away are large enough to potentially drive the profits from staying or running away below zero. In particular, $\pi^i_{run} > 0$ when $\eta_i < (P_2(1-\phi) - P_1)$, and $\pi^i_{run} \leq 0$ when $(P_2(1-\phi) - P_1) \leq \eta_i)$. The share of looters choosing to stay is thus given by

$$\Omega_{stay} = \int_0^{P_2(1-\phi)-P_1} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{P_2(1-\phi)-P_1}^{\bar{\eta}} \int_0^1 \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta, \tag{37}$$

where the first element in the sum captures the region of the parameter space in which

$\pi_{run}^i > 0$ but $\pi_{stay}^i \geq \pi_{run}^i$, while the second element captures the region in which $\pi_{run}^i \leq 0$ and $\pi_{stay}^i > 0$.

Case 2 (Large $\bar{\omega}$, small $\bar{\eta}$). In this case, $\bar{\omega} > 1$ and $0 < \bar{\eta} \leq (P_2(1-\phi) - P_1)$. Here the maximum cost of running away is small enough such that the profit from running away is non-negative. But the maximum penalty for looting is still large enough to potentially drive the profits from staying below zero. The share of looters choosing to stay is thus given by

$$\Omega_{stay} = \int_0^{\bar{\eta}} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{38}$$

The integration captures the parameter region in which $\pi_{run}^i \geq 0$ but $\pi_{stay}^i \geq \pi_{run}^i$.

Case 3 (Small $\bar{\omega}$, large $\bar{\eta}$). In this case, $\bar{\omega} \leq 1$ but $0 < (P_2(1-\phi) - P_1) < \bar{\eta}$. Here the maximum penalty for looting is small enough such that the profit from staying is non-negative. But the maximum cost of running away is still large enough to potentially drive the profit from running away below zero. The share of looters choosing to stay is thus given by

(39)

$$\Omega_{stay} = \int_0^{\bar{\omega}(P_2-P_1)-\phi P_2} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{\bar{\omega}(P_2-P_1)-\phi P_2}^{P_2(1-\phi)-P_1} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + + \int_{P_2(1-\phi)-P_1}^{\bar{\eta}} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta.$$

The first element in the sum captures the parameter region in which $\pi_{run}^i > 0$, $\pi_{stay}^i \geq \pi_{run}^i$ and $\frac{P_2\phi+\eta_i}{P_2-P_1} \leq \bar{\omega}$. The second element captures the parameter region in which $\pi_{run}^i > 0$, $\pi_{stay}^i \geq \pi_{run}^i$ and $\frac{P_2\phi+\eta_i}{P_2-P_1} > \bar{\omega}$. The third element captures the region in which $\pi_{run}^i \leq 0$ and $\pi_{stay}^i > 0$.

Case 4 (small $\bar{\omega}$ and $\bar{\eta}$). In this case, $0 < \bar{\eta} \leq (P_2(1-\phi) - P_1)$ and $\bar{\omega} \leq 1$. Here both the maximum penalty for looting and the maximum cost of running away are small enough such that the profits from staying or running away is non-negative. The share of looters choosing to stay, Ω_{stay}, will depend on whether $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} > \bar{\omega}$.

If $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} \geq \bar{\omega}$, then

$$\Omega_{stay} = \int_0^{\bar{\omega}(P_2-P_1)-\phi P_2} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{\bar{\omega}(P_2-P_1)-\phi P_2}^{\bar{\eta}} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{40}$$

The first element of (40) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} \leq \bar{\omega}$. The second element of (37) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} > \bar{\omega}$.

But if $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} < \bar{\omega}$, then

$$\Omega_{stay} = \int_0^{\bar{\eta}} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{41}$$

(41) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} < \bar{\omega}$.

Case 5 (large ϕ) In this case, $P_2(1-\phi) < P_1$. That is, the profit from running away is negative for all looters. In this situation, Ω_{stay} will simply depend on whether looting can be profitable or not if the looter stays. If $\bar{\omega} > 1$, we have

$$\Omega_{stay} = \frac{\bar{\omega}-1}{\bar{\omega}} \ . \tag{42}$$

But if $\bar{\omega} \leq 1$, we then have

$$\Omega_{stay} = 1. \tag{43}$$

In the last case, all looters will loot and stay.

B Appendix: Proof of Proposition 1

Consider first the case in which the capital control tax does not extract all profit from looters, and the penalty for looting and the transaction cost for running away can push the profit into negative territory, i.e., $P_2(1-\phi) \geq P_1$ and both $\bar{\omega} \geq 1$ and $\bar{\eta} \geq (P_2(1-\phi) - P_1)$. From Equation (**??**), we know that the mass of looters in period 1, D^l_1, this case is:

$$D^l_1 = 1 - \Omega_{no} = \frac{\bar{\omega}\bar{\eta} - (\bar{\omega}-1\ )(\bar{\eta} - (P_2(1-\phi) - P_1))}{\bar{\omega}\bar{\eta}}. \tag{44}$$

The equilibrium P_1, P_2 and D^l_1 can now be determined jointly from equations (8), (10), (44), subject to $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi) - P_1)$ and $P_2(1-\phi) \geq P_1$. To see this, assume without loss of generality that $(A - B) = 1$. Equation (8) simplifies to $P_1 = 1 + D_1^l$, while Equation (10) becomes $P_2 = 1 + \beta D_1^l$. Substituting P_1 from (8) and P_2 from (10) into the right hand side of D_1^l in (44), we have

$$(45) \qquad D_1^l = \frac{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\ )\left(\bar{\eta} - \left(\left(1 + \beta D_1^l\right)(1 - \phi) - \left(1 + D_1^l\right)\right)\right)}{\bar{\omega}\bar{\eta}} .$$

Solving the last expression for D_1^l, we find:

$$(46) \qquad D_1^l = \frac{\bar{\eta} - (\bar{\omega} - 1\ )\phi}{(\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\ )(\beta - 1) + (\bar{\omega} - 1)\beta\phi)}.$$

Last, we now need to ensure that the boundary conditions are satisfied. Thus, we are seeking parameter restrictions for which $\bar{\eta} \geq (P_2(1 - \phi) - P_1)$ and $P_2(1 - \phi) \geq P_1$. Note, first, that

$$(47) \qquad (P_2(1 - \phi) - P_1) = \left(1 + \beta D_1^l\right)(1 - \phi) - \left(1 + D_1^l\right).$$

Substituting D_1^l from (46) into (47), and noticing that $P_2(1 - \phi) > P_1$ requires $\phi < \frac{\beta - 1}{\beta + \bar{\omega}}$, we have that $\bar{\eta} \geq (P_2(1 - \phi) - P_1)$ requires $\bar{\eta} \geq ((1 + \beta)(1 - \phi) - 2)$.

Next, consider the case in which the capital control tax can extract all profit from looters, but the penalty for looting and the transaction cost for running away can also push the profit into negative territory, i.e., $P_2(1 - \phi) < P_1$, $\bar{\omega} \geq 1$, and $\bar{\eta} \geq (P_2(1 - \phi) - P_1)$.

If ϕ is large enough so that $P_1 > P_2(1 - \phi)$, it is not profitable to run way even if $\eta_1 = 0$. Hence, the mass of looters is only made up of those who loot and stay, which is profitable only if $\omega_i < 1$. Thus, a fraction $\frac{(\bar{\omega} - 1\ )}{\bar{\omega}}$, will not loot as in Equation (33), assuming that ω_i is uniformly distributed between $[0, \bar{\omega}]$. And, in this case, the mass of looters, D_1^l, will be $\frac{1}{\bar{\omega}}$.

Given $D_1^l = \frac{1}{\bar{\omega}}$, according to (8), the price at period 1, P_1, will be $1 + \frac{1}{\bar{\omega}}$. According to (10), the price at period 2, P_2, will be $1 + \frac{\beta}{\bar{\omega}}$. Denoting $\bar{\phi}$ the level of of the outflow tax rate such that $P_1 = P_2\left(1 - \bar{\phi}\right)$, we have $\bar{\phi} = \frac{\beta - 1}{\bar{\omega} + \beta}$. Therefore, if $\phi > \frac{\beta - 1}{\bar{\omega} + \beta}$, then $P_1 > P_2(1 - \phi)$, and $D_1^l = \frac{1}{\bar{\omega}}$ will be the equilibrium mass of speculation.

Consider last the case in which $\bar{\omega} < 1$ or $\bar{\eta} < (P_2(1 - \phi) - P_1)$. If $(P_2(1 - \phi) - P_1) > \bar{\eta}$, then it is always profitable to speculate and run, which then implies $D_1^l = 1$. With $D_1^l = 1$, $(P_2(1-\phi) - P_1)$ will be equal to $((1+\beta)(1-\phi)-2)$. So if $\bar{\eta} < ((1+\beta)(1-\phi)-2)$, then in the equilibrium $D_1^l = 1$. If $\bar{\omega} < 1$, then it will also always be profitable to speculate and stay, and the mass of speculation will be $D_1^l = 1$.

Combining all the boundary conditions, we then have:

(48)
$$\tilde{D}_1^l = \left\{ \begin{array}{c} \frac{1}{\bar{\omega}} \text{ if } \phi \geq \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > ((1+\beta)(1-\phi)-2) \\ \frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)} \text{ if } \phi < \frac{\beta-1}{\bar{\omega}+\beta} \text{and } \bar{\omega} > 1 \text{ and } \bar{\eta} > ((1+\beta)(1-\phi)-2) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq ((1+\beta)(1-\phi)-2) \end{array} \right\},$$

and

$$\tilde{P}_1 = 1 + \tilde{D}_1^l, \tag{49}$$

$$\tilde{P}_2 = 1 + \beta \tilde{D}_1^l. \tag{50}$$

Q.E.D.

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