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Housing and the politics of climate adaptation: a macrofinancial approach

CETEx Working Paper No. 1

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20 April 2026

Global School of Sustainability

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This paper was first published in April 2026 by CETEx at the London School of Economics and Political Science.

Suggested citation: van 't Klooster J and Hochstenbach C (2026) *Housing and the politics of climate adaptation: a macrofinancial approach.* CETEx Working Paper 1. London: Centre for Economic Transition Expertise, London School of Economics and Political Science.

DOI: 10.21953/researchonline.lse.ac.uk.00138109

Housing and the politics of climate adaptation: A macrofinancial approach

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Abstract

Projected climate damage directly threatens present-day asset values, affecting powerful economic constituencies. Yet climate-vulnerable asset (CVA) owners often fail to mobilise for decarbonisation. To analyse the politics of climate adaptation finance, this article develops a macrofinancial framework for understanding socio-economic conflict and asset owner coalition. Focusing on the highly financialised yet exposed Dutch real estate sector, it analyses how climate change plays out across the consolidated balance sheets of the Dutch housing sector. In the absence of adequate global decarbonisation efforts, building owners have an interest in maintaining stable asset values, while the financial sector prefers better disclosure of risk (which can negatively impact asset values). An incipient coalition of CVA-owners pushes to transfer climate-related losses to the public balance sheet. Asset owners protect their assets, not the planet.

Funding: We received startersbeurs funding for the Just Adapt project from the Amsterdam Institute for Social Science Research using funds from the Dutch Ministry of Education.

Acknowledgements: We would like to thank Dirk Bezemer, Maarten Bokhorst, Andrei Guter-Sandu and Zac Taylor as well as the participants in the 2025 NIG workshop on Political economy of the green transition (UGent), the Triangulation of Liquidity workshop (Sciences Po Paris), the Research Seminar Political Science (University of St Gallen) and the 2025 Spring Meeting (Hertie School, Berlin).

Section 1 Introduction

Climate policy affects powerful interests tied to the valuation of assets. Owners of fossil-fuel-dependent investments stand to lose trillions in the event of a rapid transition (Semieniuk et al. 2021), making their owners into powerful opponents of such a policy (Oreskes and Conway 2011; Brulle, Roberts, and Spencer 2024). Where it comes to asset owners that are negatively impacted by climate change, the picture is less clear. The vulnerable banking and insurance sectors continue to facilitate fossil fuel investments, in recent times abandoning key decarbonisation initiatives (RAN 2025). Exposed municipalities and communities, for example, ski resorts, have rarely turned into climate action hotbeds (Ausserladscheider 2024, 2025). Highly exposed coastal states continue to vote for climate-denying political parties (Smith, Bognar, and Mayer 2024). It is so far unclear why these asset owners have failed to mobilise politically, despite theoretical arguments suggesting these actors will organise to spur decarbonisation (Colgan, Green, and Hale 2021; Green 2025). To better understand the political behaviour of climate-vulnerable asset owners, we need to study the incentives of and policy options available to asset owners in navigating climate-related exposures and vulnerabilities.

In this article, we study climate-vulnerable asset owners, focusing on the Dutch housing sector. The Netherlands can be seen as a most likely case for the emergence of a coalition of climate-vulnerable asset owners because its housing sector is highly financialised, meaning the sector is relatively vulnerable to price shocks (Fernandez and Aalbers 2017). Furthermore, the Dutch housing system remains comparatively tightly regulated and also features a large not-for-profit housing sector (Van Der Cammen et al. 2012; Van Gent and Hochstenbach 2020), enabling the state to exert influence. Dutch financial policy is path-breaking in incorporating climate physical risk into prudential regulation, with the Dutch central bank publishing the first stress test for climate physical risk in 2017 (Siderius 2022a). Key policies for climate and environmental risk are effectively implemented in the Netherlands, in part due to EU legislation, creating an early need for asset owners to position themselves politically.

As we show, climate-vulnerable asset owners have indeed mobilised around specific options for adaptation policy, but have not united in a push for more effective mitigation policies. In the absence of adequate global decarbonisation efforts, real estate owners quibble over the cost of adaptation policy, while the financial sector prefers better disclosure of risk (which can negatively impact asset values). An incipient coalition of CVA-owners pushes to transfer climate-related losses to the public balance sheet. They protect their assets, not the planet.

Our article contributes to three literatures. First, we develop a new, two-step macrofinancial approach of mapping and policy analysis (Dutta et al. 2020; Gabor 2020) for the study of political behaviour. Macrofinance studies capitalist economies as composed of interlocking balance sheets. Previous studies have used stylised balance sheets to study economic topics such as the buildup of financial risk (Bezemer 2009; Mehrling 2010), money creation and financial crises (Gabor and Ban 2016; Murau 2017), or the funding of public spending (Murau 2020; Guter-Sandu and Murau 2022).We apply this methodology to political behaviour, focusing on the housing sector, where interests are highly mediated by complex financial structures (Aalbers 2016; Christophers 2020). Second, this new analytical perspective complements recent work on the political economy of housing and economic interests tied to the rising market value of real estate (Ryan-Collins, Lloyd, and Macfarlane 2017; Adkins, Cooper, and Konings 2021; Hochstenbach and Aalbers 2024). We put forward a systematic analysis of how climate-damage related economic interests reflect funding constraints, indirect exposures,

collateral values, disclosure requirements, and public backstops. Putting balance sheet structures at the centre of our analysis, provides a new way to study the structures of distinct housing constituencies and the financial interests that guide political strategies. Third, we apply this new analytical perspective towards understanding the political behaviour of asset owners impacted by climate-related losses (Elliott 2021; Taylor and Aalbers 2022; Besbris et al. 2024; Knuth et al. 2025). Rather than a clear interest in decarbonisation (Colgan, Green, and Hale 2021; Green 2025), we find a more ambiguous set of interests, not per se opposed, and often compatible with a less habitable planet. We thus show that a macrofinancial perspective is crucial for understanding how asset owners are affected by climate damage and how they organise in response.

The paper is structured as follows: Section 2 explains the need for a macrofinancial approach to climate adaptation, highlighting similarities and differences between mitigation and adaptation objectives, and the complex politics of housing, with its fragmented ownership, interests and financial relations.

Section 3 develops a macrofinancial approach that consists of two methodological steps: (i) the macrofinancial mapping of key stakeholders and their balance sheets, and (ii) an analysis of different policy options to (not) pursue climate adaptation and their distributional consequences.

Section 4 turns to an analysis of the first step, macro-financial mapping, to show that (i) balance sheets provide insights into how risk reverberates through the financial system and (ii) the capacity climate-vulnerable asset owners to absorb losses. Our mapping shows that building owners' net asset values far exceed the costs to materialise until 2050. Still, direct and indirect exposures as well as dependence on external finance create clear material stakes.

Section 5 turns to the second step, studying how the interests of climate-vulnerable asset owners are affected by climate adaptation policy. The interest of property owners in maintaining asset values conflicts with the financial sector's interest in better disclosure of risk. A nascent adaptation coalition seeks to transfer losses to the public balance sheet.

Section 2 Adaptation policy and financialised housing systems

In this section, we review the literature on the basic political economy of adaptation policy for housing, focusing on financial policy and its stakeholders. We propose that studying how climate risks asset owners requires careful attention to the complex interrelationships of private and public balance sheets that define today's housing system.

Asset ownership and the political economy of climate risk

Although global warming exposes societies to a wide variety of potentially catastrophic consequences, policy responses continue to fall short of meeting the magnitude of the challenge (IPCC 2022b, 2022a). In the case of adaptation policy, even determinate adaptation objectives are often lacking (IPCC 2022a). Impending climate damage has set into motion policymaking geared towards tentative societal adaptation efforts, defined by the IPCC as "adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities." For now, adaptation initiatives remain "fragmented, small in scale, incremental, sector-specific, designed to respond to current impacts or near-term risks, and focused more on planning rather than implementation" (IPCC 2022a: 20). In face of this new reality, the IPCC introduced the

term adaptation gap, defined as "the distance between actually implemented adaptation and a societally set goal" (IPCC 2022a: 20).

Today's reality is, accordingly, one of two competing imperatives: mitigation and adaptation, each with its own constituencies (Oatley 2024). To analyse the associated political dynamics, Colgan, Green, and Hale (2021) distinguish between two groups whose assets are differently affected by climate change and decarbonisation efforts. Holders of climate-forcing assets (CFAs), such as fossil-fuel reserves, will oppose climate-mitigation policy. They theorise that these asset owners will face opposition from owners of climate-vulnerable assets (CVAs), whose value is threatened by global warming. CVAs include agricultural land, municipal infrastructure, real estate and the insurance and financial instruments built upon them. As climate impacts intensify, these assets face direct physical damage, devaluation, and rising insurance costs, weakening the balance sheets of households, lenders, and governments alike. Optimistically, valuation of future losses today may set into motion political efforts to decarbonise, led by CVA-holders, including property owners, the wider real-estate sector and financial sector.

Unfortunately, the politics of climate adaptation are not as straightforward as this account of a well-defined coalition of CVA-owners suggests. For one, CVA-owners typically also have sizable exposures to a rapid net zero transition. New constructions and embodied emissions lay a large claim on the remaining carbon budgets of higher-income countries (e.g. zu Ermgassen et al. 2022). Banks and insurers continue to profit from large fossil fuel investments and the provision of various services to them (RAN 2025). Adaptation policy, second, also has more heterogeneous objectives than climate mitigation policy, requiring measures that vary across regional, local and sometimes even street-level geographies. Some regions are only mildly exposed, whereas cyclones, hailstorms, flooding, wildfires, droughts, and extreme heat all have distinct impacts. Mitigation has one clear objective captured in a clear metric: reducing the atmospheric levels of CO_2 and other greenhouse gases (GHG) (van 't Klooster and Prodani 2025). CFA-owners, firms, and fossil fuel-exporting states have historically coalesced around a shared interest in casting doubt on the benefits of decarbonisation (Brulle, Roberts, and Spencer 2024; Oreskes and Conway 2011). Moreover, since the impacts of GHG-emissions on temperature are global, these often fall outside the local sphere of influence of CVA-owners. Instead, CVA-owners can mobilise for a range of more local political strategies to avoid losses. To this end, they can channel their political efforts towards ensuring state bailouts or seek favourable adaptation policy (Elliott 2021; Knight et al. 2023; Ausserladscheider 2024). Given the limited emergence of a CVA-coalition pushing for decarbonisation, we should seek to better understand how asset owners' exposures to climate risk shape their material interests.

Climate risk, adaptation and housing

The housing sector is one of the largest climate-vulnerable asset classes, creating clear scope for the emergence of a CVA-coalition (United Nations Environment Programme Finance Initiative (UNEP FI, 2023). Understanding the absence of such a coalition requires a clear analysis of how financialization structures the political economy of adaptation policy.

Higher global average temperatures raise a wide variety of risks of physical damage to residential property. This not only affects the quality of living, for example, due to exacerbated indoor heat stress (Cartwright, Khalatbari-Soltani, and Zhang 2025), but also impacts house prices (van der Straten 2023; Premchand et al. 2024), in part via

property insurability (Hennighausen et al. 2023; Taylor and Knuth 2025), creating a complex politics of loss distribution (Elliott 2021; Taylor and Aalbers 2022; Besbris et al. 2024).

While the existing literature has focused on the US, with its specific climate risks and regulatory and financial architecture, we turn to the highly-financialised Dutch housing sector (Fernandez and Aalbers 2017). Here, the largest projected cost comes from soil subsidence and its impacts on building foundations, which may amount to a total sum of 54 billion euros by 2035 (RLI 2024) and could form a risk for one in eight homeowners (AFM 2023). Based on 2020 data from *Klimaatschadeschatter* ('Climate damage estimator', see Rijksoverheid (2022)), we estimate climate damages to the housing sector to range from 36 to 91 billion euros by 2050. These are, in other words, the estimated costs of doing nothing. Apart from soil subsidence, this estimate includes various forms of water damage due to both flooding and extreme weather.[1] These damages cannot be completely ascribed to climate change, as a score of other processes also factor in, but are severely exacerbated by it.

The housing sector is particularly vulnerable to financial shocks because capital-intensive investments are tied to specific locations for longer periods of time. Individual housing units are immobile, and urban development is highly path dependent with new developments following existing built environments. With investments locked into specific locations, climate risk exposures may be severe and long-term. For individuals, house purchases typically come with mortgage repayments over 30-year periods. As climate risks are emerging well within current investment horizons and come with different degrees of uncertainty, this shapes the attractiveness of both new developments and existing real estate for investment.

The housing sector is furthermore characterised by its own complex coalitions of stakeholders. Ownership is dispersed widely across society compared to other asset classes. In all European countries, excepting Germany and Switzerland, more than half of all households are owner-occupiers. Housing wealth, as a consequence, is by far the most important stock of wealth for most households with a middle or upper-middle income (Hochstenbach and Aalbers 2024). Owner-occupancy is spread across a majority of the population. While at the macro level, and thus for the financial sector as a whole, housing's geographical contingency spreads risks, at the micro level, a small group of owners face highly concentrated risks (Knuth et al. 2025).

The stakes of climate adaptation in housing are increasingly mediated by complex financial structures, as driven by housing's financialization. Financialization is 'the increasing dominance of financial actors, markets, practices, measurements, and narratives at various scales, resulting in a structural transformation of economies, firms (including financial institutions), states, and households' (Aalbers 2016: 2; also van der Zwan 2014). Through financialization, economic relations are increasingly structured via interlocking balance sheets (Minsky [1986] 2008; Bezemer 2009, 2016; Godley and Lavoie 2016; Murau 2017, 2020), and assets are increasingly sites of power struggles (Golka, van der Zwan, and van der Heide 2024).

A key measure of housing financialization is typically taken to be mortgage indebtedness, e.g. at the macro-level in terms of mortgage-debt-to-GDP ratios (Schwartz and Seabrooke 2008), or at the micro-level in terms of loan-to-value (LTV) and loan-to-income (LTI) ratios. House prices have increased, and housing has come to figure more prominently on the balance sheets of states, firms and households (Adkins, Cooper, and Konings 2021; Ryan-Collins, Lloyd, and Macfarlane 2017). Post global financial crisis,

[1] See methodological appendix A.1.

housing financialization is further reflected in the growth of (often highly leveraged) actors such as real-estate investment trusts (REITs), institutional investors, and asset managers who deem housing an appealing asset class (Nethercote 2020; Taylor and Aalbers 2022; Wijburg, Waldron, and Le Corre 2024). Banks correspondingly increasingly channel credit to real estate (Bezemer et al. 2023). Non-market actors are also affected by financialization, as it incentivises them to behave more like market actors and engage with financial markets (Aalbers 2016). Ultimately, financialization encourages housing-market actors to more actively anticipate or respond to financial incentives and to incorporate duties into their valuation, for example, responding to climate reporting directives. Financialization, then, also shapes which climate adaptation possibilities are considered feasible (Knuth and Taylor 2023).

Reflecting these dynamics of financialization, policymakers are pursuing new, but contested, policies that turn climate change into a source of financial risk (Bolton et al. 2020; Quorning 2023; van 't Klooster and Prodani 2025). Alongside risks created by mitigation policy, potential losses due to the direct economic damage of global warming are conceptualised as climate-related physical risks. Financial risks may also stem from new regulation that requires real estate owners to take preventive adaptation measures. Disclosure is, in part, contested because it makes tomorrow's risks materialise today (Christophers 2017; Knuth et al. 2025). By requiring adequate measurement of climate risks, the state also creates new business opportunities (Condon 2023; Elliott 2024).

Understanding the complex political economy of the housing sector is not only crucial because of its own stakes, but also because, as a large literature shows, housing policy often has far-reaching impacts on political systems (Kemeny 2005; Schwartz and Seabrooke 2008; Flynn and Montalbano 2024). Housing tenure influences political preferences and voting behaviour. For example, homeownership typically reduces support for redistribution and collective safety nets while increasing support for lower taxes and measures that ensure high and increasing house prices (Ansell 2019). Policy that goes against homeowner interests – not in the least high house prices – is unpopular with this constituency and, accordingly, electorally costly (Kohl 2020).

Housing investors and developers are also influential in shaping policy. They may lobby against regulations that limit the profitability or valuation of their housing portfolios (e.g. Morgan and Reisenbichler 2022), while they also have a stake in maintaining investability. The housing sector furthermore has many other stakeholders: the banking and insurance sector, housing investors, construction companies, tenants, social housing corporations, and local and regional governments. Financialised housing systems, accordingly, ask for dedicated analytical tools to study socio-economic conflict and stakeholder coalitions.

Section 3 Methods: A macrofinancial approach

How, then, should we study how climate adaptation policy impacts its stakeholders? In the following, we focus specifically on asset owners and the way their interests are affected by different adaptation policy options. We propose a macro-financial approach, understood as the careful analysis of financial relationships as a starting point for understanding the relevant interests, political constituencies and strategies (Dutta et al. 2020; Gabor 2020). The analysis that we propose involves two steps, which we refer to as (1) mapping and (2) policy analysis of macrofinancial interests.

Macrofinancial interests

Macrofinancial interests are the interests of asset owners that derive from their specific balance sheet structure; not just the assets themselves, but also their funding by issuing debt and equity, as well as their indirect dependencies via assets and liabilities. Macrofinancial interests are *objective,* material interests, independent of whether actors also *subjectively* identify with these interests and organise around them. Stylised balance sheets depict financial relationships, thereby providing insight into these interests. These interests, in turn, provide crucial building blocks for explaining political behaviour, in particular mobilisation and coalitions of asset owners.

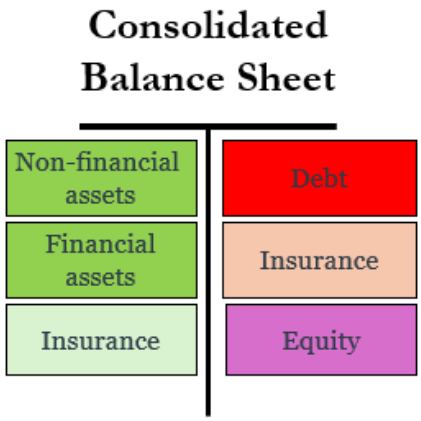

Figure 1. The structure of financialised balance sheets

For any balance sheet, assets are depicted on the left-hand side (see Figure 1). We start our account with buildings, which are non-financial assets, but also consider financial assets which result from credit and insurance extended to property owners, as well as further claims on the providers of these services.

Macrofinancial interests (see Figure 2) attach to an asset's value, both with regard to (1) high real returns and (2) low volatility and reliability; homeowners like the value of their house to go up and not fluctuate too much. Asset owners, of course, have many interests that are not financial. Beyond a focus on the "exchange value" of assets, we are also interested in (macrofinancial) interests that result from an asset's direct utility: its capacity to house people ("generate housing services") or productive capacity. Although valuation is, as with any monetary metric, an imperfect proxy for the macrofinancial interests of an economic actor, valuation under different alternative scenarios provides an approximation of interests.

Macrofinancial interests also attach to the ability to attract debt funding and equity investment that is both available at favourable terms and reliable. Real estate, of course, depends heavily on money, creating a power relationship between property owners and investors. Liabilities and equity both appear on the right-hand side of the balance sheet. Liabilities are obligations to pay, while equity represents the residual claim of the owners after liabilities are deducted from total assets. For a given economic entity, liabilities and equity constitute the sources of financing for assets on the left-hand side.

Beyond interests that pertain to conventional value fluctuations, economic actors also have a core macrofinancial interest in avoiding existential liquidity stress. "Liquidity kills you quick" (Mehrling 2010), meaning that when liabilities mature, financial obligations need to be paid or insolvency ensues. The mechanisms governing unpaid liabilities depend on legal structure—contractual maturity, collateral arrangements, and

bankruptcy procedures. Under the Dutch Faillisementswet, for example, when the debtor is deemed to have ceased payments, the court may declare bankruptcy (*faillissement*) at the request of one or more creditors.[2] However, a mortgage lender, holding a right of mortgage, can initiate a foreclosure sale without a bankruptcy proceeding (after a formal notice of default and a grace period).[3]

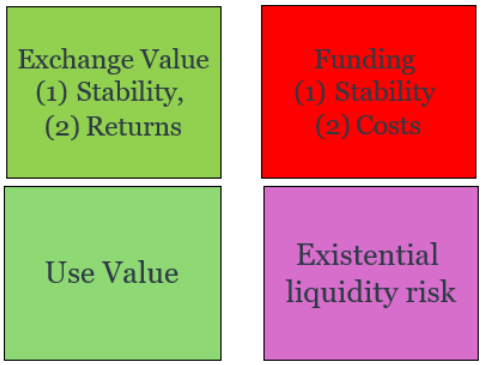

Figure 2. Macro-financial interests

Macrofinancial interests also attach to *contingent* claims and liabilities (Murau 2020: 9). Whereas debt is a fixed contractual obligation to make or receive payments at specified dates, other financial instruments (e.g. insurance) are contingent on uncertain future events such as climate damage. These contingent commitments, which include government guarantees, emergency lending facilities, and backstop arrangements, typically remain off-balance-sheet under normal conditions and can be formalised only to a limited extent. Under IFRS and similar accounting standards, a contingent claim is not recognised as an asset unless a compensable event has already occurred (ASB 2024: para. .38-42). However, it can be relevant to map these links, since contingent liabilities come with similar macrofinancial interests as non-contingent assets (e.g, low and stable costs for insurance policyholders; low and stable reinsurance costs for the issuer).

Macrofinancial interests are best understood by analysing the balance sheet as a whole rather than its separate components. For one, profits are always a function of the returns on assets and the cost of funding. Balance sheets also diversify risk. For banks and insurers, large climate-related exposures may be fatal, but small exposures are first and foremost a business opportunity. Lenders and borrower interests may align in that favourable regulatory treatment of the building owners also generates higher and more reliable returns for funders. In contrast, weakening of creditor rights may benefit debtors at the cost of creditors. Accurate identification of macrofinancial interests, accordingly, requires detailed empirical analysis.

Step 1: Mapping

The macrofinancial mapping lays out the structure of financial interests affected by climate adaptation of the housing stock.

Stylising balance sheets involves important conceptual choices and qualitative judgement as to the definition of asset classes and balance sheet consolidation. Financial assets differ with regard to crucial legal and economic variables such as issuers, who may

[2] Faillissementswet (Bankruptcy Act), Article 1.
[3] Burgerlijk Wetboek (Civil Code), Book 3, Articles 3:268–3:270.

be sovereigns, corporations, or supranational bodies; maturity, which can range from very short-term to perpetual; and liquidity, which varies between assets that trade continuously in deep markets and those that can only be sold at a discount in thin markets. Mortgages and bonds are both credit instruments, but we distinguish them in the following to highlight the relationship between bond issuers and international investors.

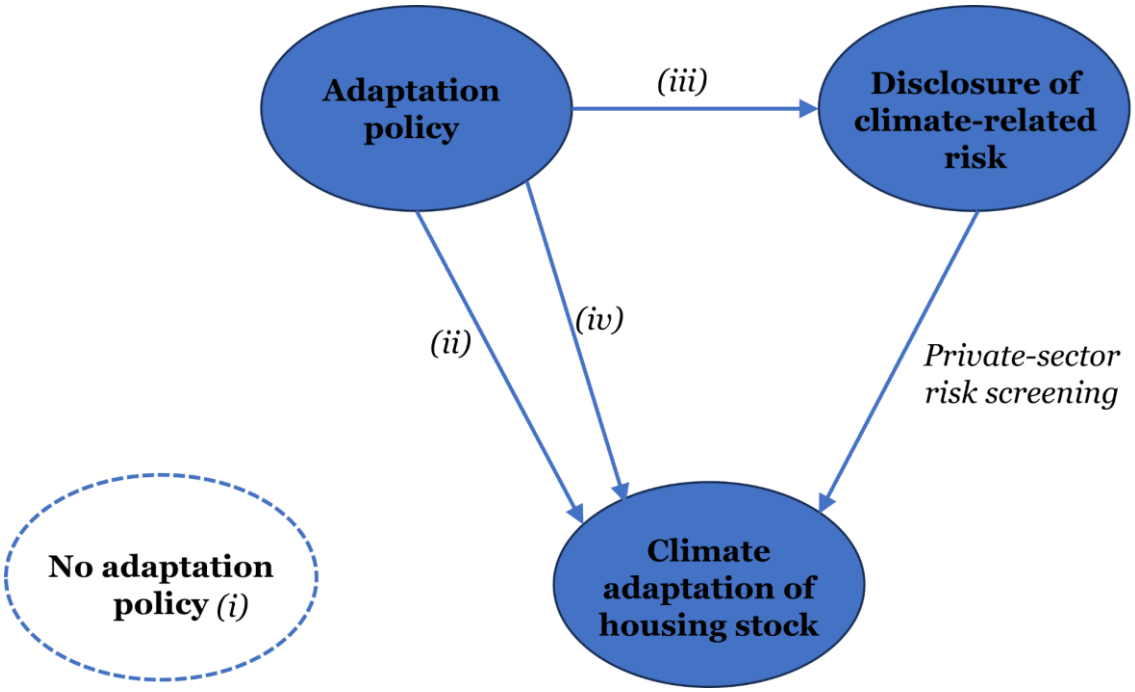

Figure 3. Four options (*i* – *iv*) for pursuing climate adaptation objectives for the housing sector

IFRS and similar standards are typically too fine-grained for macrofinancial analysis. Instead, such choices should be tailored to the research question. Any given valuation, for example, depends heavily on assumptions and valuation methods. A financial asset can be valued at its depreciated or amortised purchase value, its present-day market value ("fair value") or through discounted future cash flows. Some assets may be irrelevant or can be left out of the overall analysis. For example, banks and insurers may own their offices, but in our stylised balance sheet we depict the residential properties owned by the three main groups of property owners.

The consolidation of balance sheets combines the assets and liabilities of multiple legal entities into a single, stylised balance sheet. Consolidation eliminates claims that one actor holds on another in the same group, since they cancel out at the aggregate level. To bring out the distributive politics, consolidation should track shared financial interests as closely as possible. Depending on the research question, consolidation can happen on the level of corporate group, industrial sector, geographic entity or any other criterion. Coarse-grained consolidation typically requires more coarse-grained financial assets, since a larger variety of assets and liabilities are mapped onto one balance sheet.

For our purposes, macrofinancial mapping constitutes a tool to understand climate adaptation policy. Accordingly, in section 4, we map how the damage and financial losses that materialise for individual buildings affect asset owners directly and indirectly. This

focus will determine our definition of asset classes and the consolidation of balance sheets.

Step 2: Policy analysis

Whereas step 1 provides a fine-grained account of actors' financial interests, step 2 seeks to analyse how these interests inform preferences for policy options and, thereby, explain political behaviour. To this end, researchers can use a wide range of political-science methods.

In section 5, we put forward a preliminary analysis of how policy options to fund climate adaptation measures in the housing stock impact (the financial interests of) the main stakeholder groups identified above. Based on recent Dutch publications on the topic (SFP 2024; Bani, Barendregt, and Blom 2024; NVB 2025), we identify four distinct policy options that are debated and have qualitatively different types of impact on asset owners (see Figure 3): (i) doing nothing, (ii) mandatory adaptation measures for buildings, (iii) mandatory risk disclosure and (iv) subsidies and public intervention. We then analyse the distributional consequences of each policy option.

Our analysis here is preliminary in that it only puts forward an initial account of how macrofinancial interests translate into mobilisation for different policy options. There remains ample scope for further analysis (using e.g. qualitative case studies of policy processes, elite interviews with stakeholders, comparative analysis across jurisdictions, survey- and experiment-based approaches for measuring policy preferences, or transdisciplinary co-creation). Moreover, many climate-related costs are yet to materialise, and climate adaptation policy in housing is not (yet) systematically implemented. Our analysis makes clear how the main policy options impact the asset owners identified in step 1. This, then, provides a first account of how financial interests can explain the emergence of coalitions, or the lack thereof, among climate-vulnerable asset owners.

Section 4: Climate damage in interlocking balance sheets for buying houses

This section maps the balance sheets of climate-vulnerable asset owners, starting with the topic of interest, buildings, and the best available estimates of (future) climate damage to housing. We then trace potential financial effects as they play out across the consolidated balance sheets of the Dutch housing sector (Figure 4). Our analysis lays out three layers of balance sheet dynamics. First, direct owners of property: owner-occupiers, small landlords and larger (for-profit and not-for-profit) real estate owners. Their losses also indirectly affect our second group of asset owners: banks and other mortgage providers, as well as insurers via various liabilities. Third, the Dutch housing sector, in turn, relies on funding and reinsurance from international investors and the Dutch state, which buys debt and functions as an implicit backstop of the entire sector. We use these balance sheets to bring out interests. We also show that equity value in the system, even in highly pessimistic scenarios, dwarves expected losses until 2050, limiting the need for climate-vulnerable asset owners to mobilise.

We identify asset classes and consolidate balance sheets based on secondary data from a variety of publicly available sources. In particular, we rely on the damage estimates of the Klimaatschadeschatter, which estimates costs up to 2050 and, crucially, foresees no major sea level rise until then. We elaborate on our choices in the methodological appendix. Despite uncertainty over climate risks and data limitations for

pricing some assets, the results tell a clear empirical story and showcase how balance sheet analysis can be used to study the politics of climate adaptation finance.

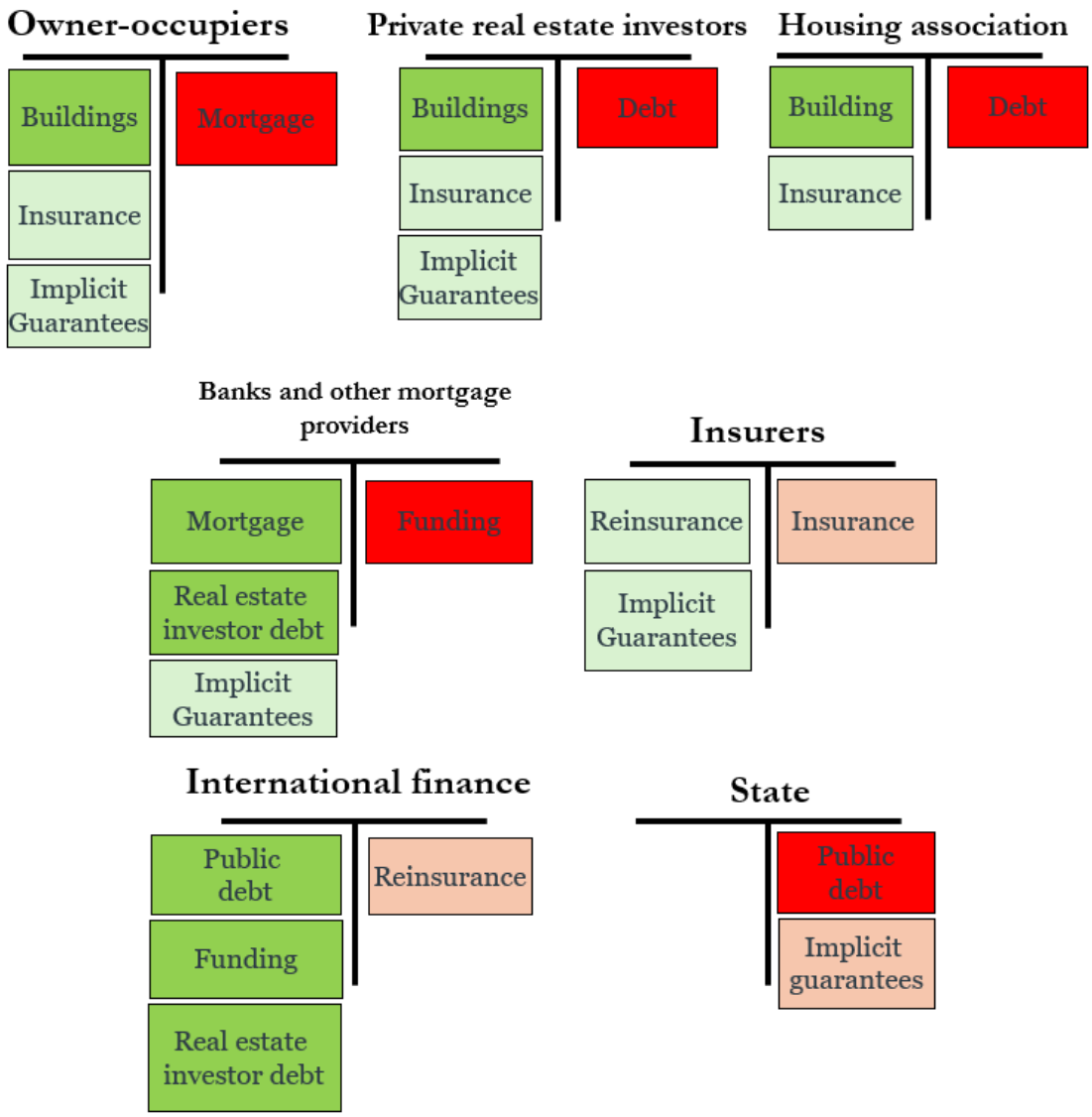

Figure 4. The balance sheet structure of financialised housing systems

Buildings and climate damage: Owner-Occupier and other real estate owners.

We divide residential real estate owners into three groups: (i) owner-occupiers, (ii) real-estate investors, and (iii) not-for-profit housing associations.

Consider first the owner-occupiers. In the stylised representation, assets and debts are represented in dark green and dark red, respectively. Light green assets and light red liabilities are payment obligations from insurance and other contingent liabilities. Around 4.7 million housing units in the Netherlands are owned by owner-occupiers, representing 57% of the total stock. These properties have a combined assessed value of €2.14 trillion in 2023.[4] These properties are non-financial assets without a corresponding claim on another actor. Any damage to buildings initially reduces the value of these assets.

[4] We elaborate upon all figures in this paragraph in methodological appendix A.3.

Homeowners owe mortgage payments to the bank, with Dutch households owing a total of €790 billion in mortgage debt in 2023. This amounts to a total net housing wealth of €1.35 trillion (value minus debt), a leverage ratio of 58% and an LTV of 37%. It is important to note, however, that house values are volatile: in 2013, when Dutch house prices bottomed out after the global financial crisis, total net housing wealth was *only* €349 billion.

Against this background of substantial housing wealth, notwithstanding volatility, projected housing-related climate damages are substantially lower. A rough estimate is that for owner-occupiers, these range between 22 and 55 billion euros up to 2050.[5] At the macro level, projected climate damages thus appear manageable for homeowners, even without the use of public funds to mitigate losses. Of course, at the micro level, this will not be the case for all owners, with some of them severely exposed and others not at all. Crucially, as owners pay down their mortgage, they build wealth from which they can pay losses, so that damage can be paid with credit and losses recouped over time.

The remainder of the Dutch residential real estate sector consists of investors owning residential units seeking investment returns (typically through rental revenue). Here, we distinguish the social-rental sector and the private-rental sector.

The social-rental sector consists of dwellings owned by housing associations, not-for-profit entities that rent out the vast majority of their properties at below-market rates to predominantly lower-income households. A total of 269 housing associations own around 2.3 million properties, or 28% of the Dutch housing stock (in 2024). Their total stock is valued at €401 billion in 2023, while outstanding debts amount to €98 billion, a leverage of 25%.[6] Again, equity far outweighs projected losses: prospective climate damages for the social-rental sector are estimated between €10 and 25 billion.[7] Furthermore, since individual properties are part of larger portfolios, risks are naturally much better diversified.

The specific funding structure of the social-rental sector is an important constraint on its ability to fund new projects, including adaptation measures. Through the *Waarborgfonds Sociale Woningbouw* (WSW, "Social Housing Guarantee Fund"), housing associations have access to low-interest loans and international capital markets. 89% of outstanding WSW-bonds are held by two Dutch publicly owned banks (WSW 2024). The WSW guarantees that if a housing association is unable to repay, other associations step in. If this also proves impossible, the state ensures repayment. In order to be eligible for WSW-guaranteed loans, housing associations have to meet various financial requirements such as LTV and Interest Coverage Ratio requirements (Conijn and Baljet 2025). Taking out loans to cover climate damages, would stress these requirements which may may ultimately negatively affect assessments by international credit rating agencies (ibid.). Furthermore, for most housing associations rent revenues are insufficient to cover the operating costs of social-rental housing ("onrendabele top", Platform31, (2024)). Climate damages or adaptation costs would further undermine their business case.

The Dutch private-rental sector consists of almost 1.2 million dwellings, or 15% of the total housing stock (in 2024). For this sector precise data is comparatively scarce (see the methodological appendix). We estimate the combined value of these dwellings at €376 billion, with associated debts amounting to around €100 billion (Rijksoverheid

[5] Methodological appendix A.2.
[6] Methodological appendix A.4
[7] See methodological appendix A.2.

2025). Projected climate damages for the private-rental sector amount to an estimated €4 to €11 billion.[8]

The private-rental sector is highly heterogeneous, with around half of the units directly owned by individuals and the other half in corporate ownership (e.g., REITs, institutional investors). Around 240,000 individuals own rental property in the Netherlands, with most of these landlords managing small portfolios consisting of one or two rental units. Landlords typically finance their properties through a combination of mortgages and their own wealth. For these landlords, we estimate the leverage ratio at 55% with their rental properties valued at €152 billion and associated debts at around €80 billion.[9] Private landlords are thus comparatively highly leveraged, even if maximum LTV ratios for investment mortgages stand at 85%, lower than for owner-occupiers for whom LTVs are capped at 100%.

For the professional rental market, consolidated overviews currently do not exist. The Dutch government estimates the average LTV for this sector to stand at a substantially lower 20% (Rijksoverheid 2025). Vesteda, the largest Dutch private real estate investment fund, owned 28,069 properties valued at approximately €9.8 billion in 2024 (S&P Global 2025). Their outstanding debts are €2.8 billion, or around 28% of property value. S&P describes this ratio as relatively conservative, although it does indicate its financial risks are intermediate, warning that increasing debts (relative to equity or earnings[10]) may result in a lower rating, which "could occur if the company undertakes large, debt-financed acquisitions, if capital expenditure (capex) exceeds our expectation, or if it experiences significant negative portfolio revaluations beyond our current base case" (S&P Global 2025: 3).

Overall, some property owners may face substantial losses, and climate damages can reduce investability (in case of market-rental housing) or aggravate loss-making (in case of social-rental). However, net assets far exceed prospective climate damages of €11 billion in the high-damage scenario.

Finance and climate risks: Bank, insurers and international finance

A second layer of climate-vulnerable asset owners concerns actors in the financial system that are indirectly affected by climate damage through financial transactions. Our choice to start with climate damage to property means that we limit our focus here to those interests that derive from investments and insurance provided to owner-occupiers and investors. The financial system has further interests, for example, through direct ownership of buildings or other investments that are affected by climate damage, which are covered there.

Dutch banks and other credit providers issue mortgages, with mortgages (€790 billion outstanding) issued to owner-occupiers almost exclusively by domestic banks. The funding available to public and private real estate investors (an estimated €280 billion in various debt) is more differentiated. Mortgages make up the largest majority of debt for smaller investors, but larger investors also access international capital markets. For example, the largest commercial real estate investor of the Netherlands, Vesteda, funds itself in international financial markets with "a combination of bank debt, Euro Commercial Paper (ECP), private placements, public bonds, and financing from the European Investment Bank (EIB)" (Vesteda 2024: 22).

[8] See methodological appendix A.2.
[9] See methodological appendix A.5
[10] EBITDA: Earnings Before Interest, Tax, Depreciation and Amortisation.

Exposure depends on the financial structure used. Lenders are at best indirectly affected by climate damage to the buildings they fund, since they only face losses when the borrower defaults. Up to the point where losses are so big that default becomes a risk, losses are absorbed by property owners. In fact, providing owners with funding to repair damage could offer new business opportunities. Dutch banks already offer additional credit to households for energy efficiency purposes and are likely to do the same for climate adaptation.

Dutch insurers are exposed to losses more directly via various forms of insurance to owners of buildings (AFM 2021; IMF 2024). From a climate perspective, insurers are the Achilles heel of housing markets (Taylor and Aalbers 2022; Knuth et al. 2025). If a building can no longer be insured it often loses the status of safe collateral for the purposes of mortgage lending. Insurers have issued insurance claims to households, but typically reinsure those claims in international financial markets. The role of insurers is less pronounced in the Netherlands than in other jurisdictions like the US, since the main protection against flooding comes from public policy. With almost 70% of the population living below sea level, insurance in the Netherlands is almost entirely unavailable for breaches of dykes of major rivers and seawalls ("primary flood defences") and only with limited availability for other forms of flooding risk (DNB 2022). Beyond catastrophic scenarios, for which only the state could provide insurance, climate risks are generally deemed manageable. The IMF (2024: 18) estimated that a repetition of the 2021 Limburg flood—adjusted for current exposures and a 25% increase in maximum precipitation—would generate net claims of about €180 million for a sample of five large Dutch property and casualty insurers, reducing the median insurer's solvency capital ratio from roughly 158 percent to 153 percent of the regulatory minimum. Here, too, insurers can increase insurance fees to deal with larger climate-related losses.

Climate-related damage is not an existential financial stability risk. Still, the combination of indirect exposure and dependence on external finance creates clear material stakes for the sector. The Dutch financial system needs adequate measurement of climate-related risks to realise these business opportunities. Moreover, the sector remains dependent in various ways on international counterparts. Real estate investors, banks and other mortgage providers borrow in international capital markets. The Dutch banking system relies extensively on funding from euro-denominated money and capital markets. Insurers also reinsure risks internationally. Accordingly, our balance sheet mapping again brings out how the material stakes of climate damage are mediated by the financial interdependencies within the Dutch real estate sector.

Section 5: Macrofinancial policy analysis

Our macrofinancial mapping has provided a fine-grained account of Dutch climate-vulnerable real estate asset owners and their macrofinancial interests. Based on this analysis, we can now turn to studying how these interests are affected by different options for climate adaptation policy.

In the broader context of Dutch climate politics, CVA-owners do not form an identifiable pro-decarbonisation coalition. Dutch climate vulnerability has not translated into particularly ambitious mitigation policies (Groen and Huitema 2025; Luiten van Zanden 2022). Key proponents of more ambitious mitigation policies appear motivated by normative and ideological commitments rather than direct material exposure to climate damage: centre-left political parties, environmental NGOs (which have been particularly effective via the courts), as well as the central bank and parts of industry (Siderius 2022b; Groen and Huitema 2025). Facing climate risks, property owners, insurers, and financial

institutions have debated risk disclosure and public-sector protection measures within existing policy frameworks (Bani, Barendregt, and Blom 2024; SFP 2024). While these actors are typically supportive of (incremental) decarbonisation efforts, this does not appear to be driven by concerns about climate risk. The Dutch financial sector remains deeply invested in climate-forcing assets.

To better understand the politics of climate adaptation, we now analyse how different policy options for adaptation affect asset holders in different ways, giving rise to divergent interests and positions of CVA-owners. The macrofinancial mapping makes it possible to identify interests, which we will now link to the individual policy options we identified in section 3 (see Figure 3). These are (i) doing nothing, (ii) mandatory adaptation measures for buildings, (iii) mandatory risk disclosure and (iv) subsidies and public intervention. The interest of property owners in maintaining stable asset values conflicts with the financial sector's interest in better disclosure of risk, which can negatively impact asset values. However, they share an interest in the ability to transfer losses to the public balance sheet.

Doing nothing

The first option, that of waiting for risks to materialise and refraining from ex-ante measures, avoids the present-day or short-term costs of adaptation measures, but accepts the costs of climate damages in the medium and longer term. If the state does less than required, but more than nothing, it may avert some of the projected climate damages, but it would still transfer costs from current to future owners and investors.

Individual homeowners and governing political parties (especially those downplaying climate change impacts) may prefer this policy option, as it avoids short-term expenses. As we saw, such a policy would be unlikely to result in insurmountable losses for most climate-vulnerable property owners and does not create big risks of losses for the Dutch financial sector, at least not within the projected time frame up to 2050.

Still, doing nothing has two clearly opposed constituencies. The first are future owners of property at risk of climate change. So far this group does not have its own representation, but its stakes are widely debated by policymakers and better-organised interest groups, one of which is the second constituency: the financial sector, which needs to be able to adequately measure risk to price it. The absence of adaptation policy also affects the perceptions of international investors, who increasingly worry about the investability of the Netherlands, given that large swaths of the country already lie below sea level. Even in less extreme scenarios, there are risks. The IMF's 2024 Article IV assessment singles out the risk to Dutch financial institutions due to the "substantial holdings of domestic real estate located in areas vulnerable to flooding." Consequently, investors may increasingly deem future investments more risky, which affects banks primarily via their funding costs and insurers via the cost of re-insurance. Research institute Deltares, for example, notes that "the financial sector pays a lot of attention to flood risks, firstly because this threat stands out in an international context – especially in the context of sea level rise" (Van Ginkel et al., 2024, p. 3, authors' translation). In accordance with these macrofinancial interests, Dutch financial institutions are acutely aware of how external risk perceptions could affect their business model (Bani, Barendregt, and Blom 2024; SFP 2024). Together with the Dutch delta commissioner, an independent advisor appointed by the state, the sector initiated NL AAA-Climate Resilient, a public-private coalition. One of its two main goals is to "increase (inter)national understanding of the Netherlands' climate resilience among investors, financial institutions, companies and other interest groups." In other words, this initiative

seeks to convey to financial markets that the Netherlands can manage sea level rises, as well as other climate risks, and that investments are safe. These efforts require measures acknowledging and adapting the Dutch housing sector to climate risks.

Make adaptation mandatory

The second option, making adaptation mandatory, imposes duties to take adaptation measures on real estate owners and developers. In other words, it imposes the costs of adaptation on private actors through regulation. The implications of this policy option differ between the *existing stock* and *new developments*.

In case of existing stock, where the bulk of climate damages in the coming decades are expected, this would entail forcing property owners to implement adaptation measures at their own cost. Our balance sheet analysis suggests most property owners, both individual and larger owners, have the financial capacity to do so, with the value of their property far exceeding liabilities. The financial sector would likely be able to market new products enabling owners to leverage housing wealth to finance measures. However, for owner-occupiers, adaptation measures have clear costs and no clear immediate gains, likely making them unpopular. Furthermore, the state can legally only impose measures if it can prove their necessity, proportionality, feasibility and subsidiarity.

In case of new developments, imposing duties on property owners is easier. Municipal governments can, and often already do, impose such requirements, for instance pertaining to affordability, quality, sustainability, as well as climate resilience. In early 2023, the national government formulated standards for climate-adaptive developments. It estimates this will lead to relatively modest additional costs of 1,100 to 5,300 euros per dwelling, while also indicating that financial gains in most cases exceed these extra costs (Ministerie van VRO 2025). However, these standards are typically not mandatory (yet). The national government has also recently refocused its policy agenda on scrapping 'unnecessary' building requirements ('red tape') to boost construction. Here, the government aligns with investors, developers and lobby organisations who repeatedly warn that regulations ultimately restrict supply.

Making climate adaptation measures mandatory imposes costs on current owners and developers of new property, who are confronted with extra costs (even if these may be capitalised in house values in the longer run). These are actors with considerable political influence, through either the ballot box (individual owners) or lobbying (investors and developers).

Market risk disclosure

Market risk disclosure for individual buildings is similarly contested within the broad CVA-coalition. Better risk screening allows potential buyers and investors to price inadequate adaptation measures when making their investment decision. Such pricing, in turn, incentivises asset owners to take adequate measures (or see their asset lose value). Like option (ii), the state imposes duties on private actors, but in this case only to disclose information about climate damage and adaptation measures to third parties.

Ongoing EU-level legislative initiatives impose requirements on financial institutions, pension funds, and other large real estate investors to identify, manage, and disclose *physical climate risks* and the measures taken to increase resilience. Under the Sustainable Finance Disclosure Regulation (SFDR) and the Corporate Sustainability Reporting Directive (CSRD), investors will be required to report both climate risk and alignment with the EU's adaptation objectives. The CSRD, for example, currently

requires that companies develop scenarios to assess the financial impact of different warming pathways and describe its adaptation measures.[11] The EU's disclosure requirements continue to face stark political opposition, which originate broadly from the CFA-coalition.

CVA-owners disagree more strikingly over disclosure requirements for owner-occupiers. In Belgium, real estate brokers, notaries and sellers need to inform buyers or long-term renters about flood risks (Vlaamse Overheid 2025). In the Netherlands, a climate label is currently under discussion that would have a more ambitious scope (Van Ginkel et al. 2024). In a white paper, Dutch banks proposed collaborating with the government and the real-estate sector to develop disclosures "in an easily comprehensible format (i.e., a climate label) [that] consist of multiple risk indicators" (Bani, Barendregt, and Blom 2024: 8). Such disclosures should become mandatory parts of "real estate advertisements, valuation reports and mortgage advice" (Bani, Barendregt, and Blom 2024: 8). Yet, the influential Dutch homeowners' lobby group Vereniging Eigen Huis (VEH 2024) opposes the introduction of climate-risk labels for dwellings, arguing that risk labels would unfairly penalise owners who have little control over location-specific hazards such as flooding or subsidence. Furthermore, apart from methodological challenges in systematically collecting fine-grained risk data, VEH fears that doing so would likely be costly to owner-occupiers.

Subsidies and public intervention

The fourth option is to collectivise costs and responsibilities. Like the second, it ascribes a leading role to state actors but does so through subsidies and public intervention. Direct subsidies are perhaps the simplest topic of overall agreement between climate-vulnerable real estate asset owners.

Direct subsidies align with the interests of various key Dutch housing actors. It addresses financial actors' concerns about the investability of the Dutch housing sector and protects against a downward revaluation of housing assets. It also keeps the costs of climate adaptation off the balance sheets of current homeowners.

So far, direct subsidies and transfers remain minimal and fragmented. Those that exist pertain, for example, to municipal subsidies available to property owners to undertake (often piecemeal) adaptive measures, or a very limited national "compensation for homeowners dealing with foundation problems." Indirect subsidies also exist, for example, in the form of state investments in adaptation measures in public space, with the benefits of such measures predominantly accruing to private property owners (e.g. Bode, Hamming, and Velthuis 2023).

To the extent that a coalition of climate-vulnerable real estate asset owners has emerged, it is one pushing for larger public transfers to homeowners. In 2024, the Dutch Council for the Environment and Infrastructure, a strategic advisory board for the government, proposed a 12 billion euro direct investment by the state up to 2035 to help homeowners address foundation problems (RLI 2024: 14). Building on this report, a recent initiative ("Funderingscoalitie") has pushed for such public subsidies, bringing together the homeowners' lobby group, institutional investors, housing associations, banks, and insurers (NVB 2025). As we saw, public bailouts may be required for a limited group of homeowners who would be unable to pay the costs of adaptation measures (or,

[11] EC, Commission Delegated Regulation (EU) 2024/857 of 31 July 2023 supplementing Directive (EU) 2022/2464 as regards the European Sustainability Reporting Standards (ESRS), Annex I, ESRS E1 §37–§45.

of climate damages). However, other homeowners would also benefit, despite having accrued substantial stocks of housing wealth. Even if housing wealth is overall very unequally distributed (Hochstenbach & Aalbers 2024), across income brackets housing assets substantially outweigh mortgage debts (CBS 2025), raising questions about the cost effectiveness of subsidization. Effectively, subsidies suggest tenants and homeowners alike end up paying for the protection of the assets of a smaller group of property owners.

Section 6: Conclusion

This paper developed a macrofinancial framework for socio-economic conflict and asset owner coalitions in adaptation policy. We first developed a balance sheet mapping to analyse how climate-related losses play out across the consolidated balance sheets of the Dutch housing sector. We then used this mapping to the interests of asset owners in alternative adaptation options. We showed that owners have an interest in maintaining stable asset values, while the financial sector prefers better disclosure of risk (which can negatively impact asset values). An incipient coalition of CVA-owners pushes for transferring climate-related losses to the public balance sheet.

Our findings make three broader contributions to the literature. First, we contribute methodologically to the field of macrofinancial political economy (Dutta et al. 2020; Gabor 2020; Guter-Sandu, Haas, and Murau 2024). We develop a novel approach to understanding the macrofinancial interests of asset owners, drawing on an analysis of stylised balance sheets (*macrofinancial mapping*) and the implications of different policy options to pursue adaptation objectives (*policy analysis*). Beyond our object of study, we expect this approach to be a useful instrument to systematically study the interests of asset owners in order to subsequently explain their political behaviour.

Second, our analysis contributes to the literature on the politics of housing systems in an era of climate change. Our analysis provides insights into why asset owners favour certain policy options. While the literature has highlighted housing asset ownership and valuation as crucial drivers of political interests and behaviour (e.g. Adkins et al. 2021; Ansell 2019; Ryan-Collins et al. 2017), our analysis underscores associated liabilities, for example as structured by disclosure requirements, public backstops, and funding constraints. At the same time, we do not directly capture other types of interests. For owner-occupiers, their property is not merely a financial asset but also a place to live, potentially shaping policy preferences. A follow-up question is, thus, whether macrofinancial interests nonetheless align with coalition formation and policymaking on housing.

Third, we also contribute to the literature on the politics of climate adaptation. We show that rather than sharing an interest in decarbonisation, as Colgan et al. (2021) suggest, CVA-owners have a much more ambiguous set of interests (see also Ausserladscheider 2025). We show that in the Netherlands, property owners can, at least on the macro-level, handle the foreseeable costs of climate risk and adaptation measures. Ample risk buffers of property owners limit the cost of climate damage to houses for banks, and insurers also remain more than able to absorb expected claims. Whereas property owners have good reason to favour policy options that allocate losses elsewhere, for the financial sector well-measured climate risks are also a business opportunity. Whereas climate-forcing asset owners share an interest in obstructing the very project of decarbonisation, local coalitions of climate-vulnerable asset owners lack such a shared cause. Instead, they push for their preferred policy options in pursuing climate adaptation and a public bailout.

The highly leveraged Dutch housing system is particularly vulnerable to financial risks, yet foreseeable costs and their indirect impact remain manageable; financial risks in less financialised housing contexts are likely smaller. Because other housing systems are also dependent on mortgage finance, investors and international finance, albeit to different degrees, we expect similar financial risks to cascade through these systems via interlocking balance sheets, giving rise to similar, but distinct political dynamics.

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Methodological appendix

In the paper, we report figures on prospective climate damages across housing tenures, and balance sheets. Some reported figures were not readily available from these sources, but required us to make additional selections and calculations. The data we report are incomplete and come with a notable degree of uncertainty. Future climate damages are uncertain for a number of reasons, such as those pertaining to data limitations, inherent uncertainties in climate scenarios, and the unequal distribution of risks across geographies, housing sectors and stakeholders. Also, for some sectors financial positions are opaque, requiring additional estimations.

To arrive at these figures, we draw on data from multiple sources and need to make various assumptions. In this supplementary file, we explain these data and our assumptions.

A.1 Estimating climate damages to the housing stock

Klimaatschadeschatter (Rijksoverheid 2022) estimates the costs of different climate risks in two different scenarios (one without further climate change, and one with stronger climate change) with a margin of error. It estimates total climate-related damages of 77.5 to 173.6 billion euros up to 2050. This is based on the KNMI'14 climate scenarios developed by The Royal Netherlands Meteorological Institute. Klimaatschadeschatter subsequently translates these projections into different climate damages to the built environment. These projections do not consider changes in valuation, demographic changes, land-use changes. They furthermore assume the absence of further climate adaptation measures. Further information on the development of this tool can be found in RIVM et al. (2020).

The Klimaatschadeschatter includes various damages that cannot directly be ascribed to housing such as agricultural damages, declining labour productivity and excess mortality due to heat stress. Based on reported subcategories, we arrive at damages of 36 to 91 billion euros in damages to the property sector. This figure is the sum of projected costs due to soil subsidence (8.8 to 53.7 billion euros), direct water damage to property (16.1 to 25.7 billion euros) and indirect water damage to property (7.2 billion euros). It also includes half of the total damages due to hail (4.3 billion euros). We further use the scenario of stronger climate change, and report both low and high estimates. We have not included costs related to agricultural damages (23 to 51 billion euros), heat stress (up to 6.8 billion euros), hospitalizations (0.1 billion euros), wild fires (up to 0.225 billion euros), the oak processionary (0.3 to 1.3 billion euros), and public greenery (up to 0.1 billion euros) as they can not (directly) be ascribed to the housing sector.

These are rough projections that come with a notable degree of uncertainty. These figures are not precise estimations of specific damages, but rather broader approximation of aggregate damage. However, such a rough approximation is suitable for estimating their impact. As we show in our empirical analysis, the assets of all housing actors vastly exceed projected damages.

A.2 Assigning climate damages to different housing tenures

We assign total housing-related climate damages (36 to 91 billion euros) to different housing tenures. We recognize that both climate risks and housing tenures are unevenly distributed across space. We therefore link municipal-level projections of climate damages to municipal-level distributions of housing tenures. Municipal-level projections of climate damages are derived from Klimaatschadeschatter. Municipal housing data is derived from the Kerncijfers Wijken en Buurten (*Core Figures Boroughs and*

Neighbourhoods) from Statistics Netherlands. We use municipal data for 2020, as this aligns with the Klimaatschadeschatter.

Based on municipal distributions of climate damages and housing tenures, we assign around 60.4-60.8% of climate damages to the owner-occupied sector, 27.5-27.9% to the social-rental sector, and 11.6-11.7% to the private-rental stock. These should be considered rough estimates. For example, it does not take into account geographically uneven distributions of risks and property within municipal borders, nor does it take into account the fact qualitative differences between tenures (such as owner-occupied property typically being larger, more likely to be single-family homes rather than apartments, or being of higher value). Interestingly, these distributions are not very different from overall tenure distributions in the Netherlands, where 57% of housing is owner-occupied, 28% is social rental, and 15% private rental.

A.3 Owner-occupiers' housing assets and mortgage debts

We derive owner-occupiers' housing assets and mortgage debts from Statistics Netherlands (2025). These data aggregate tax registers, reporting assessed housing values (*WOZ*) and outstanding mortgage debts. Note that these data only pertain to primary residences, but see A.5 below.

Table A.1 Owner-occupiers' housing values, mortgage debts, net housing wealth and Loan to value ratio (LTV). Note: all values (except LTV) in billions of euros, not corrected for inflation. Source: Statistics Netherlands (2025).

	Housing values	Mortgage debts	Net housing wealth	LTV
2006	1,032	486	546	47
2007	1,120	528	592	47
2008	1,221	573	647	47
2009	1,232	608	624	49
2010	1,167	628	539	54
2011	1,181	648	533	55
2012	1,136	672	464	59
2013	1,028	679	349	66
2014	1,030	674	357	65
2015	1,062	667	396	63
2016	1,115	674	440	60
2017	1,201	683	518	57
2018	1,313	699	614	53
2019	1,442	715	727	50
2020	1,551	722	829	47
2021	1,719	739	980	43
2022	2,107	764	1,344	36
2023	2,141	790	1,351	37

A.4 Housing association balance sheets

We derive housing associations' balance sheets from the datacenter of Aedes, an umbrella organization representing housing associations (see Table A.2). Tangible fixed assets refer to the assessed value of the total stock owned by housing associations, long-term liabilities refer to outstanding loans.

Note that official accounts report substantially higher LTV ratios (45% in 2023) than the balance sheets suggest (see Table A.3). The reason is that in calculating this ratio, they rely on the "policy value" of housing associations' real estate, rather than assessed market value. The policy value is lower because it takes into account that property is in a rented state, and rents stand at below-market rates.

Table A.2. Consolidated balance sheet of Dutch housing associations. Note: All values in billions of euros, not corrected for inflation. Source: Aedes (2025).

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total assets	178.1	181.4	191.1	269.7	285.2	316.6	347.7	373.0	432.8	430.3	412.1
Effects	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Financial fixed assets	4.3	4.7	5.2	5.4	6.2	6.3	7.2	7.6	7.7	7.6	7.3
Immaterial fixed assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Liquid assets	3.1	2.9	3.4	3.2	3.2	2.3	2.5	2.3	2.7	2.6	2.2
Tangible fixed assets	167.3	170.8	180.3	259.1	274.0	306.3	336.3	361.3	420.6	418.4	400.9
Projects in progress	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supplies	1.1	1.0	0.9	0.7	0.7	0.6	0.6	0.5	0.4	0.5	0.4
Claims	2.3	1.8	1.2	1.1	1.0	1.0	1.1	1.1	1.3	1.2	1.2

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total liabilities	178.1	181.4	191.1	269.7	285.2	316.6	347.7	373.0	432.8	430.3	412.1
Equalization account	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equity	74.9	78.8	91.5	173.2	190.9	222.7	251.3	274.4	330.1	325.1	301.8
Short-term liabilities	8.5	8.1	7.7	7.2	7.4	7.2	7.1	6.9	6.8	6.6	6.9
Long-term liabilities	92.0	92.0	89.9	87.0	84.5	83.9	86.3	88.4	92.6	94.7	98.2
Provision	2.6	2.4	2.0	2.3	2.4	2.7	3.0	3.3	3.2	3.9	5.2

Table A.3 Interest Coverage ratio (ICR) and Loan to Value ratio (LTV) of Dutch housing associations. Note: based on policy value (beleidswaarde) of property. Source: Aedes (2025).

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
ICR		1.93	2.04	2.19	2.32	2.08	2.07	2.05	2.20	2.33	2.18
LTV		64	62	61	61	51	49	45	40	38	45

A.5 Private landlords' housing assets and liabilities.

Using Dutch register data (the System of Social-statistical Datasets, managed by Statistics Netherlands), we estimate the assets and debts that are directly linked to these rental portfolios in 2023. We do so drawing on full-population tax registers.

According to these registers, around 240,000 landlord households own a total of 540,000 rental units. After data cleaning, data are available for 200,000 of these landlords, owning 440,000 properties. Furthermore, these data do not include the housing portfolios people may indirectly own via shell companies. These data are thus not complete, but nevertheless give a clear indication of landlords' assets and liabilities.

Landlords' housing portfolios, excluding owner-occupied property but including potential second homes, are on average valued at €635,000. Note that these portfolios vary in size, from single units to hundreds of dwellings.

We estimate average outstanding debts tied to these portfolios at €348,000. This is a rough estimate: debts related to these portfolios are not directly measured, but Dutch tax registers include an unspecified category of "other debts" that exclude mortgage debts on owner-occupied property and student debts. For non-landlord households, these "other debts" average €12,000. For landlord households, these stand at €360,000. We therefore estimate the 'additional' landlord debt at €348,000. This is a rough proxy.

For the 200,000 landlords in our dataset, this amounts to collective rental portfolios valued at €131 billion, and debts of €72 billion. Assuming identical distributions for the total group of 240,000 landlords, these assets and debts would stand at €152 billion and €83 billion, respectively. This translates into an LTV of 55%.

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