

Essays on the Political Economy of Crisis and Reform

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Summary

The severe political and economic repercussions of the ‘euro crisis’ during the last decade have revealed the necessity for an improved understanding of both the determinants of sovereign debt crises and the political economy of structural reforms. This dissertation, which consists of three self-contained papers, contributes to these research areas.

In the first paper, we investigate the interaction of fiscal federalism and sovereign default risk. Numerous countries with chronic external debt problems are characterized by inefficient federal fiscal structures. However, the impact of a country’s federal design on sovereign default risk has barely been studied in previous work. This paper aims to address this gap. We develop a stylized model of a federation in which regions borrow individually from international lenders while the central government decides whether to default on aggregate sovereign debt. We show that decentralized borrowing leads to higher debt levels, at higher bond yields, an increased default probability and lower welfare compared to a benchmark scenario of centralized borrowing. Moreover, differing regional default costs further increase aggregate welfare losses through distorted regional borrowing incentives. Case studies of Argentina and the euro area illustrate the channels described in the model.

The second paper analyzes how domestic distributional incentives influence sovereign default on debt held by foreign creditors. In a simple political economy model, we show that external default can serve as a redistributive policy similar to distortionary income taxation. The channel we derive builds on recent evidence which suggests that the output costs of default are mainly incurred by high-income households, whereas relatively poor ones benefit due to smaller public spending

cuts. Although the potentially important role of income heterogeneity among domestic agents has attracted comparatively little attention in previous work, historical evidence is in line with our argument.

In the third paper (with Johannes Brumm, published in *Economic Inquiry*), we argue that an important determinant of voters' support for economic reform is the strength of family ties. While the 'crisis hypothesis' predicts that crises facilitate reform, we show in a political economy model that this relation can break down, and even reverse, when agents take into account the effect of reform on their family members. Applied to southern European countries with strong family ties, the model rationalizes why the extremely high (youth) unemployment following the Great Recession has not led to more substantial labor market reforms. In such countries austerity might block rather than foster additional structural reforms.

To my parents

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List of Abbreviations

CRRA	Constant Relative Risk Aversion
ECB	European Central Bank
EFSF	European Financial Stability Facility
EMU	Economic and Monetary Union
ESM	European Stability Mechanism
HDI	Human Development Index
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
WVS	World Values Survey

1 Introduction

When the Great Recession hit the world economy in 2008, GDP in many countries dropped massively and unemployment soared, in particular in Europe and the United States. As a response to this extremely large shock, governments around the world engaged in very expansive fiscal policy to attenuate the most severe consequences of the crisis. In hindsight, there is widespread agreement among economists that the relatively quick and resolute fiscal response has saved the global economy from collapse. However, these rescue measures came at a price. Budget deficits rocketed in many countries, leading to severe debt problems.

In the euro area, some countries had already accumulated excessive debt levels before the outbreak of the crisis and were consequently pushed to the edge of exclusion from international capital markets. Only a concerted reaction by the European Central Bank (ECB) and euro area governments – culminating in the creation of the European Financial Stability Facility (EFSF) and the European Stability Mechanism (ESM) – was able to avoid a break-up of the euro area. The Economic and Monetary Union (EMU) is still recovering from the repercussions of the crisis. Only in 2017 the euro area reached its pre-crisis level of GDP. Unemployment, especially among the young, remains very high in many countries and monetary policy still operates at the zero lower bound, additionally supported by massive asset purchases through the ECB.

The experiences of the global financial crisis and the European debt crisis have revived economists' interest in research on sovereign debt and default, which was pioneered by Eaton and Gersovitz (1981). In the 1980s, in particular countries in Latin America experienced an unprecedented series of sovereign defaults, which sparked research efforts in the field. The debt problems of numerous euro area member states, especially Greece's default in 2012, have shown that sovereign debt

crises are not an exclusive phenomenon of emerging economies, which in turn led to a new wave of academic interest in sovereign default.

Moreover, the traumatizing experience of a possible break-up of the young European currency union spurred a debate on how to improve the resilience of European economies and the currency union as a whole. A lack of competitiveness and inflexible economic structures on the national level were identified as main culprits for the outbreak of and the slow recovery from the crisis. As a consequence, the necessity of structural reforms in the member states (including the liberalization of product and labor markets, the reform of legal and pension systems and privatizations) was highlighted by economists and politicians alike.

However, the implementation of reforms met massive political resistance in many member states of the euro area as the long-term benefits of reform usually go along with partly significant short-term costs, which are often borne by small, but powerful groups of society. It is therefore important to develop an improved understanding of the factors that determine political resistance to reform. This dissertation aims to contribute both to the literature on sovereign debt crises (Chapters 2 and 3) and to the political economy of reform (Chapter 4).

In *Chapter 2*, we study the interaction between a country's federal fiscal structure and sovereign default risk within a stylized two-period model of a federation. Numerous countries with chronic external debt problems are characterized by inefficient federal fiscal structures. However, the impact of a country's federal design on sovereign default risk has barely been studied in previous work. This chapter aims to address this gap.

As a starting point, we develop a benchmark case in which only the central government can borrow in international capital markets. The government is utilitarian and maximizes a representative household's welfare by using external borrowing and potential default as a tool for consumption smoothing. This setting corresponds to the common approach in sovereign debt models. Next, we allow for decentralized borrowing by two symmetric regions (i.e. the regions are identical with regard to all characteristics: size, endowment, preferences, default costs and political influence on the central government) that can borrow individually from international lenders and are only concerned with the welfare of their respective

constituencies. The central government maximizes the welfare of the federation as a whole and decides whether to default on the federation's aggregate debt, which is the sum of the regional debt levels. This setting implies a soft budget constraint between central and regional governments, as the latter anticipate a potential bail-out. As a result, when making decisions on lending to the regions, foreign investors determine the price of loans based on the level of aggregate rather than regional debt. We show that decentralized borrowing leads to higher interest rates, a higher aggregate debt level, an increased default probability and lower welfare compared to the benchmark of centralized borrowing.

In a next step, we relax the assumption of symmetry among regions and analyze how diverging default costs affect the model's endogenous variables. This asymmetry is motivated by a relatively recent strand in the empirical sovereign debt literature which finds that sovereign default leads to a reduction of output via a negative impact on the private sector, in particular due to reduced credit supply to domestic firms from international financial markets. Since industries vary significantly in their degree of dependence from international loans, heterogeneous industry structures between regions of a federation lead to diverging regional default costs.

Asymmetric default costs increase the inefficiency caused by decentralized borrowing in our model. The region with low default costs incurs a disproportionate level of debt, whereas the high-cost region's debt level is too low from a welfare-maximizing perspective. This is because regional governments are aware of the impact of additional borrowing on the bond price and the default probability. Therefore, the low-cost region can incur higher debt at the expense of the high-cost region, as the latter will keep its borrowing inefficiently low to preserve a relatively moderate aggregate debt level. As a consequence, debt of the federation as a whole remains at a comparable level to the symmetric case, but regional debt and welfare differ significantly. Overall, the federation's welfare further decreases.

To illustrate the relevance of the model's assumptions and implications, we first present a case study of Argentina as the features of the model are well reflected in the politico-economic system of Argentina. We argue that decentralized borrowing by the provinces and soft budget constraints through implicit and explicit guarantees by the central government have indeed played a significant role for the severe

sovereign debt problems that characterize Argentina's economic history. Next, we discuss the implications of our analysis with regard to the euro area and argue that the model can shed some light on developments in the run-up to and during the debt crisis in the euro area.

Chapter 3 analyzes how domestic distributional incentives influence sovereign default on debt held by foreign creditors. The analysis is motivated by the 'lost decade' for Latin America's economic development in the 1980s. Debt crises haunted the region and led to an unprecedented series of sovereign defaults. While this decade marked a particularly severe episode, debt problems have plagued many Latin American countries ever since attaining independence. Besides its history of defaults, pronounced income inequality has been and still is a striking characteristic of the region.

This chapter theoretically analyzes a potential connection between these phenomena. Does the distribution of income within a country affect the government's decision to default on its external debt obligations? And in case of default, does income inequality affect the outcome of a debt restructuring, i.e. the size of creditor losses ('haircuts')?

We propose an affirmative answer to these questions. The reason is that external default does not only redistribute wealth *between* international creditors and the sovereign debtor as highlighted in most of the sovereign debt literature, but also has distributional effects *within* a defaulting country. Building on recent empirical findings on sovereign defaults, the main contribution of this chapter is to carve out a potentially important theoretical channel that rationalizes a positive correlation between the extent of income inequality and both default probability and size. Hence, our contribution is to improve the understanding of the trade-off between efficiency losses of sovereign default and domestic redistribution, a question that has found little attention in previous work.

Concretely, to analyze the relation between income distribution and external default risk, we develop a formal framework building on a static public finance model and add (non-enforceable) external debt as a novel feature. This approach deviates from the traditional sovereign debt literature which focuses on representative agent models and hence cannot account for the role of income heterogeneity among

domestic agents. Moreover, we do not follow the common approach of modeling default as a binary choice between complete default and full repayment. In line with real-world sovereign debt crises, we treat creditor losses as a continuous variable which represents partial defaults. As our analysis focuses on domestic distributive aspects of default, allowing for a partial default is helpful as it captures the ‘size of the cake’ which can be redistributed. Finally, we assume that the government is not benevolent but opportunistic in the sense that it follows the median household’s preferred policy.

More specifically, our theoretical line of argument goes as follows. Households face a trade-off: On the one hand, default on debt held by foreign creditors is costly because the domestic private sector suffers from deteriorating external financing conditions. This leads to inefficiencies in production which cause a drop in output. The output loss is increasing in haircut size as higher haircuts lead to worse financing conditions and longer capital market exclusion. On the other hand, default benefits households since resources initially earmarked for debt service can be reallocated to public spending. Households are asymmetrically affected by a default depending on their relative income position within society. We show that the households’ preferences for default are inversely ordered by income, i.e. the higher a household’s income share, the lower the preferred haircut. This is because the larger is a household’s share of overall income the more painful is the output loss associated with a marginal increase of the haircut size. Conversely, a relatively poor household prefers a higher haircut as the utility loss from a reduction in output is small compared to the benefit of additional government spending. The policy finally implemented depends on the political regime. We show that, compared to a social planner, an opportunistic government within a median voter framework is more prone to default.

Chapter 4 (with Johannes Brumm, published in *Economic Inquiry*) contributes to the literature on the political economy of reform. We argue that an important determinant of voters’ support for economic reform is the strength of family ties in society. While the ‘crisis hypothesis’ predicts that crises facilitate reform, we show in a political economy model that this relation can break down, and even reverse, when agents take into account the effect of reform on their family members.

To provide a concrete illustration of the mechanism that relates intra-family altruism and voting behavior, we consider a labor market reform within an insider-outsider framework. As a first step of the formal analysis, we develop a benchmark scenario without altruism: the individualistic case. In this scenario all outsiders are in favor of reform whereas all insiders oppose it and thus the rationale of the crisis hypothesis applies: if the economic situation deteriorates, the share of outsiders rises and so does support for reform.

Next, we extend the model by introducing intra-family altruism. We first assume that agents value their family members' well-being as strongly as their own: the completely altruistic case. In this scenario it can occur that outsiders who would prefer reform in the absence of altruism now vote against it as they take into account the effect of reform on their family members. Consider a 'mixed family' that consists of one insider and one outsider. Reform jeopardizes the insider's income but improves the job perspectives of the outsider who could become an insider in case of reform. We show that, depending on the degree of altruism, the family member who is an outsider votes in favor of reform only if the improvement in employment perspectives is sufficiently good. If the outlook is not good enough, the outsider also prefers to preserve the status quo which ensures one high and secure insider income that can be shared between family members via transfers. If, however, the chances for the outsider family member to obtain an insider job through reform are relatively good, the insider family member might even support reform.

Thus, strong family ties do not necessarily reduce support for reform, yet they substantially alter the relation between economic circumstances and support for reform. This is our key insight: the implication of the crisis hypothesis might be reversed in the presence of intra-family altruism – in times of crisis opposition to the implementation of reform is strong whereas good economic circumstances might even encourage reform.

2 Sovereign default risk in a federation

2.1 Introduction

Numerous countries with persistent external debt problems are characterized by federal systems in which the interplay of different government layers creates welfare-decreasing externalities. For example, the design of the fiscal relations between the federal level and the provinces in Argentina is regarded as a main reason for the country's notorious history of debt crises, in particular due to soft budget constraints between the regions and the central government (see, among others, Acemoglu, 2003 and Mussa, 2002).¹ It is therefore highly relevant to develop a detailed understanding of the link between fiscal federalism and sovereign debt crises.

But while the problem of soft budget constraints has been extensively studied in research on fiscal federalism, it has attracted little attention in the sovereign debt literature in the tradition of Eaton and Gersovitz (1981). This is surprising as sovereign debt models are often calibrated to Argentine data due to its comprehensive history of external debt crises. But although Argentina is the classic country of reference for research on sovereign debt, the role of its federal system for external debt accumulation is widely neglected. Supposedly, the reason why these two literature strands are not more strongly interlinked is that, on the one hand, research on fiscal federalism mostly focuses on redistributive aspects with regard to the domestic tax system and only allows for domestic debt (and excludes the option of default). The access to external debt is usually not considered.

1. Empirical work by Rodden and Wibbels (2010) highlights the problem of soft budget constraints between different layers of government for several federations.

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On the other hand, the bulk of theoretical work on sovereign debt focuses on the insurance aspect of default and builds on representative agent models: A benevolent government uses external non-contingent debt and potential default to insure the representative household against adverse endowment shocks. This approach necessarily ignores heterogeneity among agents, which is however required to model a federal system.

The contribution of this chapter is to make a first step to overcome the gap between these two research areas. We embed a federal political system into a two-period sovereign debt model and analyze the impact of decentralized borrowing by regional governments on bond prices, debt levels, the probability of default and overall welfare of the federation.

As a starting point, we develop a benchmark case without decentralized regional borrowing. A utilitarian government maximizes a representative household's welfare by using external borrowing and potential default as a tool for consumption smoothing. This setting corresponds to the common approach in sovereign debt models. Next, we allow for decentralized borrowing by two symmetric regions (i.e. the regions are identical with regard to all characteristics: size, endowment, preferences, default costs and political influence on the central government) that can borrow individually from international lenders and are only concerned with the welfare of their respective constituency. The central government maximizes the welfare of the federation as a whole and decides whether to default on the federation's aggregate debt, which is the sum of the regional debt levels.² This approach implies a soft budget constraint between central and regional governments, as the latter anticipate a potential bail-out. As a result, when making decisions on lending to the regions, foreign investors determine the price of loans based on the level of *aggregate* rather than *regional* debt. We show that decentralized borrowing leads to higher interest rates, a higher aggregate debt level, an increased default probability and lower welfare compared to the benchmark of centralized borrowing.

We then relax the assumption of symmetry among regions and analyze how diverging default costs affect the model's endogenous variables. Introducing asymmetric default costs is motivated by a relatively recent strand in the empirical

2. The assumption of centralized default is in line with theoretical and empirical work on default (see, for instance, Kim and Zhang, 2012, and Eichler and Hofmann, 2013).

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sovereign debt literature that analyzes the nexus between sovereign and private-sector costs of default (see Arteta and Hale, 2008, and Kohlscheen and O'Connell, 2008, for pioneering work). This work shows that sovereign default leads to a reduction of output via a negative impact on the private sector, in particular due to reduced credit supply to domestic firms from international financial markets.

Since industries vary significantly in their degree of dependence on external capital (see, for example, the seminal contribution by Rajan and Zingales, 1998), heterogeneous industry structures between regions of a federation lead to diverging regional default costs. This asymmetry increases the inefficiency caused by decentralized borrowing in our model. The region with low default costs incurs a disproportionate level of debt, whereas the high-cost region's debt level is too low from a welfare-maximizing perspective. This is because regional governments are aware of the impact of additional borrowing on the bond price and the default probability. Therefore, the low-cost region can incur higher debt at the expense of the high-cost region, as the latter will keep its borrowing inefficiently low to preserve a relatively moderate aggregate debt level. As a consequence, debt of the federation as a whole remains at a comparable level to the symmetric case, but regional debt and welfare differ significantly. Overall, the federation's welfare further decreases.

To illustrate the relevance of the model's assumptions and implications, we first present a case study of Argentina as the features of the model are well reflected in the politico-economic system of Argentina. We argue that decentralized borrowing by the provinces and soft budget constraints through implicit and explicit guarantees by the central government have indeed played a significant role for the severe sovereign debt problems that characterize Argentina's economic history. Next, we discuss the implications of our analysis with regard to the euro area. We argue that our model can shed some light on developments in the run-up to and during the debt crisis in the euro area. Finally, we derive policy implications with regard to the institutional architecture of the euro area.

The chapter is organized as follows. Section 2.2 describes the related literature. Section 2.3 develops the model setup. The case studies are presented in Section 2.4 and Section 2.5 concludes.

2.2 Related literature

The chapter is mainly related to research on fiscal federalism and to the literature on sovereign default. In the decentralized scenario, our model implicitly assumes a soft budget constraint between the regional and the federal levels, as the latter provides a certain degree of insurance to the regions through potential centralized default. The soft budget constraint is an important concept in the work on fiscal federalism and was originally formulated by Kornai (1986) to shed light on economic behavior in socialist economies (also see Kornai et al., 2003, for a detailed discussion). Economic implications of the soft budget constraint have been comprehensively analyzed in theoretical work (among others, see Dewatripont and Maskin, 1995, Goodspeed, 2002, Lockwood, 2002, Besfamille and Lockwood, 2008, and Robinson and Torvik, 2009). Numerous empirical studies demonstrate the existence of and inefficiencies caused by soft budget constraints in many federal countries (see, for example, Rodden, 2002, Rodden et al., 2003, Rodden and Wibbels, 2010, and von Daniels, 2016).

Empirical work provides evidence that central governments often assume the responsibility for unsustainable regional debt, which in turn increases the likelihood of default by the central government (see Eichler and Hofmann, 2013). Moreover, as in our model, theoretical work on decentralized borrowing by the private sector also assumes centralized default (see Jeske, 2006, Wright, 2006, and Kim and Zhang, 2012). While these authors focus on private-sector external borrowing, we analyze decentralized borrowing by sub-sovereign governments.

As described above, regional governments often have a soft budget constraint vis-à-vis the central government, i.e. central governments (explicitly or implicitly) guarantee regional external debt. As a consequence, when pricing loans to regional governments, foreign lenders often provide equal financing conditions to very unequal regions regarding economic fundamentals (see, for instance, Sola and Palomba, 2015).

The second literature strand this chapter builds on is the classic sovereign debt literature in the tradition of Eaton and Gersovitz (1981) and Arellano (2008). This

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work mainly builds on representative agent models.³ A benevolent government uses external non-contingent debt and potential default to insure the household against adverse endowment shocks. In these models, non-repayment is costly due to temporary capital market exclusion (thereby taking away the insurance mechanism) and output losses. An important difference to the models that analyze soft budget constraints in the literature on fiscal federalism (for example, Goodspeed, 2002) is that interest rates are endogenous. The international investor internalizes the risk of default, which in turn affects bond prices. This important feature is also present in our model.

The assumption of diverging regional default costs builds on research on the public-private nexus of sovereign default. A growing strand of the sovereign debt literature analyzes private sector costs of external public debt and default (see Arteta and Hale, 2008, Kohlscheen and O’Connell, 2008, and Ağca and Celasun, 2012). This empirical work finds that sovereign debt crises have adverse spill-over effects on the domestic economy through large declines of foreign credit to the domestic corporate sphere (see Arellano et al., 2017, and Kaas et al., 2016, for quantitative sovereign debt models that analyze this channel).

In addition to these results, the question which industries are particularly affected by external credit constraints is of relevance to our analysis. As described in their seminal paper on financial dependence and growth, Rajan and Zingales (1998) show that industries vary strongly in their dependence on external finance. ‘Young’ companies and high-technology industries (e.g. computing and pharmaceuticals) heavily depend on external finance, whereas mature industries – agriculture being the prime example – do not require significant external financing at all. Hence, the former are much more affected by reduced credit supply through international capital markets caused by sovereign default. Several recent studies allow a more sophisticated look at the public-private nexus of external default. Acharya et al. (2014) and Ferrando et al. (2017) show that increasing sovereign risk negatively spills over to both the financial sector and the non-financial sector. Hébert and Schreger (2017) show in a case study of Argentina that foreign-owned firms,

3. More recent work introduces heterogeneity in sovereign debt models. For instance, D’Erasmus and Mendoza (2016) allow for wealth heterogeneity among agents and analyze distributional incentives for domestic sovereign default.

exporters and banks suffer disproportionately from default. Moreover, spillovers of increased sovereign risk to the private sector are present both in emerging markets and developed economies (Augustin et al., 2016, and Bedendo and Colla, 2015).

2.3 The model

Consider a two-period economy with stochastic endowments. The political system is composed of a central government and two regional governments. Borrowing is decentralized, i.e. each region can borrow individually in international financial markets. Debt is non-enforceable. The decision whether or not to default on *aggregate* debt is made by the central government, regions cannot default individually. This assumption reflects a bailout of the regions through the federal government, a situation often observed in real-world sovereign debt crises (see, for instance, Eichler and Hofmann, 2013). Sub-national governments maximize the utility of a regional representative household, whereas the central government maximizes the welfare of the federation as a whole.

In the following, we first derive a benchmark case without decentralized borrowing. This setting corresponds to the common approach in sovereign debt models: A utilitarian government maximizes a representative household's welfare by using external borrowing and potential default as a tool for consumption smoothing. Next, issuing debt is decentralized, which means that borrowing decisions now take place at the regional level, but the default decision remains with the central government. Regions are assumed to be symmetric, i.e. they are identical with regard to all characteristics: size, preferences, default costs and political influence on the central government. We then study how the interaction between the regional and the central governments affects debt levels, bond prices and the default probability compared to the benchmark. Finally, we introduce heterogeneity among regions regarding default costs and analyze how this adjustment affects the endogenous variables of the model.

2.3.1 Benchmark case: Centralized borrowing

A benevolent government borrows in period 0 to smooth a representative household's consumption over the model's two periods. For simplicity, we assume there is no endowment in period 0 such that consumption can only be financed via external borrowing. The only asset traded in the economy is a non-contingent one-period bond b issued by the government in period 0. International lenders are assumed to operate in a perfectly competitive lending market and are risk-neutral. Hence, given a risk-free world interest rate r , expected profits of international lenders are zero. In period 1, the household receives endowment y and the government decides whether to default on period 0 debt or to repay, depending on the exogenous cost of default η and the realization of the endowment in period 1. Utility of the representative household over the two periods is given by:

$$u(c_0, c_1) = \ln(c_0) + \mathbb{E}(c_1)$$

where c_0 and c_1 denote the respective consumption levels and $\mathbb{E}(\cdot)$ refers to the expected utility in period 1, depending on repayment or default.⁴ The budget constraint of the representative household in period 0 is given by

$$c_0 = q(b)b$$

where $q(b)$ denotes the bond price. Under the zero-profit assumption for international lenders, the bond price $q(b)$ is set as follows:

$$q(b) = \frac{1 - p(b)}{1 + r}$$

where $p(b)$ denotes the probability that the central government decides to default in period 1 and r denotes the risk-free rate. The budget constraint of the representative household in period 1 depends on the central government's decision whether to

4. Note that the utility function is only concave in period 0 utility and linear in period 1 utility. This assumption significantly reduces the model's complexity without affecting the general results. Moreover, note that we implicitly assume a discount factor of one. Again, this assumption simplifies the analysis without affecting the model's qualitative results.

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default or not. In case of repayment the period 1 budget constraint becomes:

$$c_1 = y - b$$

Endowment y is uniformly distributed over the unit interval: $y \sim U[0, 1]$. If the government decides to default, the budget constraint takes the following form:

$$c_1 = (1 - \eta)y$$

where η denotes the exogenously given output cost of default. In period 1, the benevolent government (after observing the realization of endowment y) decides whether to default or not based on the solution to the following optimization problem:

$$\max_{d \in \{0,1\}} \{v_1^{d=0}(b, y), v_1^{d=1}(y)\}$$

where $v_1^{d=0}(b, y)$ and $v_1^{d=1}(y)$ denote the values of the social welfare function in period 1 (after the realization of y) in case of repayment and default, respectively. Substituting from the budget constraints, the welfare functions can simply be expressed as:

$$v_1^{d=0}(b, y) = y - b \quad , \quad v_1^{d=1}(y) = (1 - \eta)y$$

Hence, the government is indifferent between repayment and default at the threshold value of y , $\bar{y} = \frac{b}{\eta}$. If the realization of y is below the threshold value \bar{y} , the central government defaults whereas it repays if y exceeds the threshold. The threshold's composition is intuitive: in case of large debt the likelihood of default increases whereas default becomes less likely if the cost of non-repayment is high.

In period 0, the government chooses debt level b to maximize the representative household's utility over the model's two periods and hence solves the following problem:

$$\max_b \left\{ \ln[q(b)b] + \int_0^{\bar{y}(b)} [(1 - \eta)y] dy + \int_{\bar{y}(b)}^1 (y - b) dy \right\}$$

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Solving for the the first-order condition yields:

$$[q(b)b]^{-1} \left[\frac{\partial q(b)}{\partial b} b + q(b) \right] + (1 - \eta) \bar{y} \frac{\partial \bar{y}(b)}{\partial b} + \int_{\bar{y}(b)}^1 (-1) dy - (\bar{y} - b) \frac{\partial \bar{y}(b)}{\partial b} = 0$$

Since endowment y is uniformly distributed over the unit interval, default probability $p(b) = \bar{y} = \frac{b}{\eta}$, and therefore $q(b) = \frac{1 - \bar{y}}{1 + r} = \frac{\eta - b}{\eta(1 + r)}$ and $\frac{\partial q(b)}{\partial b} = -[\eta(1 + r)]^{-1}$, we obtain:

$$\left[\frac{b(\eta - b)}{\eta(1 + r)} \right]^{-1} \left[\frac{\eta - 2b}{\eta(1 + r)} \right] + \frac{(1 - \eta)b}{\eta^2} + \frac{2b\eta - b - \eta^2}{\eta^2} = 0$$

This expression further reduces to

$$\frac{\eta - 2b}{b(\eta - b)} - \frac{(\eta - b)}{\eta} = 0$$

and finally yields

$$b^3 - 2b^2\eta + b(\eta^2 + 2\eta) - \eta^2 = 0.$$

For given values of η , this cubic equation can be solved in closed form. If $\eta = 0$ the solution is $b = 0$, which is intuitive since in the absence of any default cost it is always optimal for the central government to default. Anticipating that international lenders are unwilling to provide loans to the government. Stipulating concrete values for the default cost η yields the results in Table 2.1 for the optimal debt level b^* , the bond price $q(b)$, the default threshold \bar{y} , and the representative household's expected utility $u(\cdot)$.⁵

The results show that an increasing default cost η leads to a higher optimal debt level b^* , at a higher bond price $q(b)$ – which implies lower refinancing costs for the government – and a decreasing default threshold \bar{y} , implying a lower default probability. Moreover, the utility of the household is strictly increasing with

5. We assume a risk-free rate of 1%, which is standard in sovereign debt models (see Mendoza and Yue, 2012).

TABLE 2.1: Overview of results for given values of default cost η

η	b^*	$q(b)$	\bar{y}	$u(\cdot)$
0.1	0.049	0.501	0.493	-3.248
0.2	0.097	0.507	0.487	-2.605
0.3	0.144	0.514	0.480	-2.248

higher default costs (for the entire range of endowment y).⁶ We now analyze the case of decentralized borrowing and compare it to the benchmark of centralized borrowing.

2.3.2 Decentralized borrowing

Regional governments now make individual borrowing decisions. In a first step we analyze the case of two regions that are identical with regard to all characteristics (i.e. size, preferences, default costs and welfare weight in the central government's value function), called the symmetric case. We then analyze an asymmetric case by allowing for differing regional default costs.

Symmetric case

In contrast to the centralized case, the borrowing decision is now made by the regional governments. The default decision (on aggregate debt), however, remains with the central government. Since the model is solved by backward induction, we first analyze the central government's problem in period 1.

The central government's problem

The central government's only action is to decide whether or not to default on aggregate debt in period 1. As in the benchmark case, the government observes the realization of the endowment which again is uniformly distributed over the unit interval, but now equally split between the two regions, which are denoted by

6. The results in Table 2.1 and the following analysis should not be interpreted quantitatively. The aim of this chapter is to derive theoretical channels that can help to guide future quantitative and empirical work.

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subscripts A and B . Moreover, the central government observes the aggregate debt level, which is the sum of the regional debt levels, $B = b_A + b_B$, and then decides whether to default or not based on the solution to the following optimization problem:

$$\max_{d \in \{0,1\}} \{v_1^{d=0}(B, y), v_1^{d=1}(y)\},$$

where $v_1^{d=0}(B, y)$ and $v_1^{d=1}(y)$ again denote the values of the social welfare function in period 1 in case of repayment and default, respectively. Due to the linear utility in period 1, the values are simply given by:

$$v_1^{d=0}(B, y) = y - B, \quad v_1^{d=1}(y) = (1 - \eta)y$$

Hence, the value of y at which the central government is indifferent between repayment and default is $\bar{y} = \frac{B}{\eta}$.

Regional governments

In the symmetric case the representative regional households' preferences are identical and represented as follows:⁷

$$u(c_0, c_1) = \ln(c_0) + \mathbb{E}(c_1)$$

Equivalent to the benchmark case, the economy is endowed with stochastic income y in period 1. The endowment is equally distributed among regions, so each region receives $y/2$. Regions can issue bonds b_i (where $i = A, B$) in period 0 which mature in period 1. Debt b_i is priced according to $q(B)$. Importantly, recall that the price of debt depends on the federation's aggregate debt $B = b_A + b_B$, and is not priced according to region-specific fundamentals.

Hence, the budget constraint for representative regional household A (the fol-

7. Since the two regions are identical, we drop notation that distinguishes the regions whenever possible in order to ensure readability.

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lowing results are derived from region A's perspective) in period 0 is given by:

$$c_0 = q(B)b_A$$

The bond price is determined by

$$q(B) = \frac{1 - p(B)}{1 + r}.$$

The budget constraints are given by

$$c_1 = y/2 - b_A \text{ and } c_1 = (1 - \eta)y/2,$$

depending on repayment or default, respectively. Regional government A chooses b_A in period 0. Importantly, since each regional government is only concerned with the welfare of its respective representative household, it issues bonds of a size that is *individually* optimal. However, it must take into account that the cost of debt is increasing with the level of *aggregate* debt. Hence, region A takes as given region B's debt level b_B and solves the following problem:

$$\max_{b_A} \{ \ln[q(B)b_A] + [\int_0^{\bar{y}(B)} [(1 - \eta)y/2] dy + \int_{\bar{y}(B)}^1 (y/2 - b_A) dy] \}$$

where $\bar{y}(B) = B/\eta$ is the threshold value of y at which the central government is indifferent between repayment and default. The first-order condition yields:

$$\begin{aligned} [q(B)b_A]^{-1} [\frac{\partial q(B)}{\partial b_A} b_A + q(B)] + [(1 - \eta)\bar{y}(B)/2 \frac{\partial \bar{y}(B)}{\partial b_A} \\ + \int_{\bar{y}(B)}^1 (-1) dy - (\bar{y}(B)/2 - b_A) \frac{\partial \bar{y}(B)}{\partial b_A}] = 0 \end{aligned}$$

Since $q(B) = \frac{1-p(B)}{1+r} = \frac{\eta-B}{\eta(1+r)}$, we obtain $\frac{\partial q(B)}{\partial b_A} = -\frac{1}{\eta(1+r)}$. Moreover, $\frac{\partial \bar{y}(B)}{\partial b_A} = \eta^{-1}$. Finally, $\int_{\bar{y}(B)}^1 (-1) dy = B/\eta - 1$. Hence, the first-order condition becomes:

$$\left[\frac{(\eta - B)b_A}{\eta(1+r)} \right]^{-1} \left[\frac{\eta - B - b_A}{\eta(1+r)} \right] + (1 - \eta) \frac{B}{2\eta^2} - 1 + \frac{B}{\eta} - \left(\frac{B - 2\eta b_A}{2\eta^2} \right) = 0$$

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which further reduces to

$$\frac{\eta - 2b_A - b_B}{b_A(\eta - b_A - b_B)} + \frac{1.5b_A + 0.5b_B - \eta}{\eta} = 0$$

and finally yields

$$1.5b_A^3 - b_A^2(2.5\eta - 2b_B) - b_A(1.5\eta b_B - 0.5b_B^2 - \eta^2 - 2\eta) - \eta^2 + \eta b_B = 0.$$

In a symmetric equilibrium, the two identical regions choose the same optimal debt level b_i . Therefore, we can set $b_A = b_B = b_i$. This yields

$$4b_i^3 - 4\eta b_i^2 + b_i(\eta^2 + 3\eta) - \eta^2 = 0.$$

We can now compare the results of the symmetric case to the benchmark case. First, we again stipulate concrete values for default cost η and derive the respective values for regional debt b_i , aggregate debt B (which is then compared to the debt level in the benchmark case), bond price $q(B)$ and utility $u(\cdot)$.

TABLE 2.2: Comparison of debt levels between symmetric and benchmark case

η	B	Benchmark
0.1	0.0664	0.0493
0.2	0.1323	0.0974
0.3	0.1977	0.1441

The results in Table 2.2 show that for a given default cost η , the aggregate debt level B (i.e. the sum of the regional debt levels) in the case of decentralized borrowing is strictly larger than in the benchmark case. The results for the remaining endogenous variables are reported in Table 2.3.

As the bond price $q(B)$ is decreasing in the aggregate debt level B , the cost of borrowing is higher in the decentralized scenario. Moreover, since the probability of default is given by B/η , it is larger in the decentralized case compared to the benchmark. Finally, the federation's welfare is strictly lower in the decentralized scenario (see Table 2.6 on page 22 for an overview of welfare levels in the three different scenarios).

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TABLE 2.3: Further results of the symmetric case.

η	$q(B)$	\bar{y}	Regional utility	Aggregate utility
0.1	0.332	0.664	-3.601	-7.203
0.2	0.335	0.661	-2.943	-5.887
0.3	0.337	0.659	-2.573	-5.147

Asymmetric regional costs of default

We now allow for asymmetry between regions with respect to the cost of default. This difference is supposed to capture the nexus between sovereign risk and private-sector refinancing costs. The underlying idea is that regions have different industry structures in which firms are asymmetrically dependent on external capital. The cost of sovereign default spills over to the private sector as firms incur higher costs of refinancing. Consequently, the cost is higher for those regions in which industries rely more heavily on external capital.

To capture this effect analytically, we introduce an ‘asymmetry parameter’ $\gamma \in [0, 1]$. In case of default, the region with higher default costs receives utility $(1 - \eta(1 + \gamma))y$ in period 1 whereas the region with lower costs obtains $(1 - \eta(1 - \gamma))y$. Obviously, if $\gamma = 0$ there is no asymmetry and the situation boils down to the symmetric case. If $\gamma = 1$, the high-cost region carries the entire burden of default, whereas the other region incurs no default cost at all.

We now analyze the impact of asymmetry on the debt level, bond price, default probability and welfare. First, note that the period 1 decision of the central government remains unaffected, since only the aggregate debt level (and the realization of the endowment) matter for the default decision. The default threshold hence remains B/η . We assume that region A is the high-cost region and region B the low-cost region. Region A hence solves the following problem:

$$\max_{b_A} \{ \ln[q(B)b_A] + \left[\int_0^{\bar{y}(B)} [(1 - \eta(1 + \gamma))y/2] dy + \int_{\bar{y}(B)}^1 (y/2 - b_A) dy \right] \}$$

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which yields the first-order condition for high-cost region A:

$$\frac{\eta - 2b_A - b_B}{b_A(\eta - b_A - b_B)} + \frac{2b_A + b_B - 0.5(1 + \gamma)(b_A + b_B) - \eta}{\eta} = 0$$

Accordingly, the first-order condition for low-cost region B becomes:

$$\frac{\eta - 2b_B - b_A}{b_B(\eta - b_B - b_A)} + \frac{2b_B + b_A - 0.5(1 - \gamma)(b_B + b_A) - \eta}{\eta} = 0.$$

Assuming an asymmetry parameter $\gamma = 0.5$, the solution to the first-order condition yields the following results, as depicted in Table 2.4:

TABLE 2.4: Overview of results in the asymmetric case with $\gamma = 0.5$

η	$b_{high-cost}$	$b_{low-cost}$	B	\bar{y}	$q(B)$
0.1	0.033	0.033	0.066	0.664	0.332
0.2	0.065	0.066	0.132	0.661	0.335
0.3	0.097	0.100	0.197	0.659	0.337

The results for the regional debt levels, aggregate debt B , default probability \bar{y} and bond price $q(B)$ are almost identical to the symmetric case. However, as can be seen in Table 2.5, the regional utility levels are diverging significantly.

TABLE 2.5: Welfare in the asymmetric case with $\gamma = 0.5$

η	$u_{high-cost}$	$u_{low-cost}$	$u_{symmetric}$
0.1	-3.799	-3.771	-3.601
0.2	-3.145	-3.091	-2.943
0.3	-2.780	-2.698	-2.573

The low-cost region obtains a strictly larger utility level than the high-cost region. This is because the low-cost region can free-ride on the high-cost region as the latter reduces the borrowing costs for the federation as a whole. As a consequence, the low-cost region incurs higher debt than optimal from the federal perspective, whereas the high-cost region keeps its borrowing inefficiently low to preserve a relatively moderate aggregate debt level, anticipating that higher aggregate debt

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increases the probability of default. Compared to the symmetric case, the high-cost region is always worse off, whereas the low-cost region can attain utility levels similar or even slightly above (for low levels of γ and high values of η) the ones in the symmetric case. Aggregate welfare, however, is always smaller than in the symmetric case (see Table 2.6).

TABLE 2.6: Welfare comparison

η	Centralized	Decentralized & Symmetric	Decentralized & Asymmetric
0.1	-3.248	-7.203	-7.571
0.2	-2.605	-5.887	-6.237
0.3	-2.248	-5.147	-5.478

Table 2.6 summarizes the welfare implications of the different scenarios. Decentralized borrowing leads to higher debt levels, at higher yields, increased default probability and lower welfare compared to the benchmark scenario of centralized borrowing. Consequently, the welfare of the federation as a whole is strictly larger in the centralized scenario. Introducing diverging default costs leads to distorted regional borrowing incentives that further increase aggregate welfare losses.

2.4 Case studies: Argentina and the euro area

This section discusses the model's assumptions and implications in light of the Argentine default history on the one hand and with regard to the euro area debt crisis on the other hand. The case of Argentina aims to highlight the important interaction between fiscal federalism and sovereign default risk (in our model the comparison between the benchmark case and the symmetric case).⁸ The discussion

8. The federal system of Argentina has been subject to numerous case studies in economics and political science (see, among others, Acemoglu, 2003, and Remmer and Wibbels, 2000). We therefore only focus on those aspects that are relevant for our analysis, without giving a detailed account of the history, politics and economics of Argentine federalism.

of the euro area mainly focuses on the aspect of distorted borrowing incentives through diverging regional default costs (the asymmetric case in the model).

2.4.1 **Argentina**

Due to its extensive default history, Argentina is *the* prime example referred to in the sovereign debt literature (for surveys of the theoretical and empirical literature on sovereign debt, see Aguiar and Amador, 2014, and Tomz and Wright, 2013, respectively). In numerous studies, quantitative dynamic sovereign debt models are calibrated to Argentine data (see, for instance, the seminal contribution by Arellano, 2008). However, these models usually ignore the fiscal structure of the country.

Our abstract theoretical analysis can of course only reflect part of the complex Argentine politico-economic system and its default history. Nevertheless, an informal mapping of the model's elements to the Argentine case can help to highlight the relevance of a country's federal fiscal architecture for debt accumulation and default decisions.

The model's crucial assumptions and implications are (i) a federal system with decentralized borrowing; (ii) a default history in which the center assumed responsibility for sub-sovereign debt; (iii) (almost) identical pricing of sub-sovereign debt despite diverging economic fundamentals; (iv) heterogeneous regions regarding economic development, which implies diverging regional costs of sovereign default; and (v) distorted borrowing incentives for regions with low default costs as these incur sub-optimally high debt levels, and vice versa for high-cost regions. In the following, these aspects are discussed in more detail with regard to Argentina.

Argentina's debt crises and fiscal federalism in a nutshell

Since attaining independence in 1816, Argentina defaulted eight times on its sovereign debt, four defaults occurred since the beginning of the 1980s. The most recent case took place in 2014 and the default of 2001/2002 resulted in one of the largest debt restructurings in history (only outstripped by Greece's default in 2012). Argentina defaulted on about 100 billion dollars of its debt owed to private

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creditors, which represented 37 percent of GDP in 2001. Moreover, GDP decreased by about 14 percent following the default (see Arellano, 2008).

Argentina is a highly decentralized country, both fiscally and politically. Regional governments dispose of strong expenditure and borrowing autonomy, even in global perspective (see, for instance, Tommasi et al., 2001). The provinces are responsible for a large share of total spending, but they only collect a small fraction of overall taxes. This allocation of competences leads to a significant vertical fiscal imbalance (see Jones et al., 2000). In 2008, almost a third of the Argentine provinces – mostly economically backward ones – received transfers from the central government that made up more than 80% of their total revenue (Ardanaz et al., 2014).

Moreover, provinces can borrow relatively autonomously in international capital markets. In the run-up to the default of 2001/2002 provincial debt increased significantly. The spending spree led to a bailout by the federal government that assumed provincial debt equivalent to 10.8 percent of GDP (von Daniels, 2016). In the year of the provincial bailout, the central government defaulted on its obligations to international creditors – corresponding to the mechanism described in our model. As shown by Nicolini et al. (2002), such bailouts of regional governments have occurred frequently during the recent decades – either through direct financing of regional debt, or indirectly, for instance by the assumption of costs for provincial pension systems through the central government.

These cases suggest that the federal system in Argentina indeed has a severe soft budget constraint problem, which has led Mussa (2002) to argue that Argentina's federal structure is mainly responsible for the country's chronically critical fiscal situation: 'Many of Argentina's fiscal problems [...] arose from inadequate fiscal discipline in the provinces [...] [which] are perennially in deficit and, from time to time, have called on the central government to assume responsibility of their debts' (p. 14 f.).

Sub-sovereign bond yields and the soft budget constraint

Our analysis assumes that international investors offer the same lending conditions to all regions, independent of their economic fundamentals. In the presence of

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a hard budget constraint between central and regional governments, financial markets would charge risk premia from regions with worse fiscal fundamentals. Under a soft budget constraint, however, this link is expected to weaken or break down as investors might anticipate a bail-out through the center (or through inter-regional compensation).

This link between (the absence of significant) risk premia and soft budget constraints – and hence an important assumption of the model – is backed by recent empirical research. For example, Beck et al. (2017) find that the positive link between sub-sovereign debt and risk premia tends to break down when sub-sovereign government debt is relatively high, which could reflect the market's expectation of a federal bailout as fundamentals deteriorate. Sola and Palomba (2015) find that market pricing becomes less effective in the presence of guarantees from the central government. Using secondary market data from the US, Canada, Australia and Germany, they show that the pricing of risk premia for sub-national governments is less responsive to fiscal fundamentals when there is some form of implicit or explicit guarantees from the center. More generally, in a panel analysis of up to 30 emerging markets in the period 1993 – 2008, Eichler and Hofmann (2013) find that higher levels of fiscal and political decentralization increase sovereign default risk.

The concrete case of Argentina supports the conjecture that investors anticipate a regional bail-out through the center and hence do not demand (significantly) diverging risk premia from the provinces. Della Paolera and Grandes (2012) analyze the period from 1997 to 2002, when Argentine provinces were significantly tapping funds abroad. They show that in the run-up to the default of 2001/2002 the credit ratings of economically quite different provinces were equal (or at most differed one notch on the rating scale) and unchanged for years, and subsequently were all sharply downgraded in the first and second quarters of 2001, just before the peak of the debt crisis.

Also today the equal treatment of economically very diverging Argentine provinces continues to be common practice. For instance, both the City of Buenos Aires and the province of Chaco dispose of the same credit rating (at B2 on Moody's rating scale in December 2017, which implies 'speculative and subject to high credit

risk').⁹ While the former province ranks second among all Argentine provinces on the Human Development Index (HDI) and has a diversified economy with a focus on banking and manufacturing, the latter ranks last on the HDI.¹⁰ The province of Chaco has the lowest GDP per capita and the highest poverty rate in Argentina and generates income mainly through an underdeveloped agricultural sector. Moody's justifies this same rating for the two regions by arguing that it 'reflects the very close economic and financial linkages that exist between Argentina's government and Argentine sub-sovereigns'.¹¹

Public-private nexus of default and diverging default costs

In the asymmetric case of the model, we assume diverging regional default costs. This assumption is motivated by the heterogeneity of regional industry structures. The economic structure in Argentina is indeed very heterogeneous. The provinces are quite diverse regarding economic development - ranging from highly urbanized and industrialized to very poor and rural (see Remmer and Wibbels, 2000). Advanced industries that depend on external finance are mainly located in and around Buenos Aires, whereas the rather poor provinces in the periphery barely dispose of advanced industries (see the comparison of the City of Buenos Aires and the province of Chaco above).

A recent case study of Argentina by Hébert and Schreger (2017) finds that foreign-owned firms, exporters and banks suffer disproportionately from default, which confirms findings in numerous earlier studies on the cost spillover from the public to the private sector. Hence, it is reasonable to assume that the costs of default are diverging significantly between the Argentine provinces.

The key implication of the asymmetric case of our analysis is that regions with low default costs can free-ride on the high-cost regions when it comes to debt accumulation, which in turn leads to welfare losses for the federation as a whole. In the case of Argentina it is difficult to support this theoretical implication empirically due to limited availability of data on sub-sovereign debt levels. Moreover, it is

9. Information taken from Moody's website: www.moody.com (Accessed January 3, 2018).

10. Data provided by the United Nations Development Programme: www.undp.org (Accessed January 3, 2018).

11. See Moody's website: www.moody.com (Accessed January 3, 2018).

difficult to obtain evidence that confirms the hypothesis that regional governments have been aware and have deliberately made use of the interaction of regional debt levels described in the model. However, in the following we argue that this channel might have indeed been at work in the euro area during the financial and debt crises.

2.4.2 The euro area

The cases of Argentina and the euro area differ significantly on many levels (including federal design and economic development). Still, in the following we argue that our analysis can also shed some light on developments in the run-up to and during the European financial and debt crises. Building on this analysis, we derive policy implications with regard to the institutional architecture of the euro area.

The role of the ESM and the ECB

The euro area is of course not a classic federation as it lacks a central government. However, we argue that both the ECB's expansionary monetary policy since the outbreak of the crisis (in particular through the start of quantitative easing in March 2015) and the fiscal support to Greece, Ireland, Portugal, Spain and Cyprus through the EFSF/ESM adjustment programmes can be interpreted as similar to the role of the central government in our model. Both measures provide relief on the debt burden of the member states through reduced interest payments. For instance, Greece saved 9.9 billion euros (amounting to 5.6% of GDP) due to favorable funding costs in 2016, thus providing a significant relief for its budget.¹² Since the central government in our model does not issue own debt, but merely decides on how to cope with the federation's aggregate debt, this interpretation is even closer to our model than the Argentine case.

12. Calculations are taken from the website of the ESM: www.esm.europa.eu/impact-budgets (Accessed January 10, 2017).

Convergence of borrowing costs

The euro area is a striking example of the convergence of borrowing costs for economically very different countries. Following the introduction of the euro, the yields of EMU's member states quickly converged to the yield of the German bund (see, for example, Ehrmann et al., 2011). This convergence process is often interpreted as proof that the financial markets did not judge the prohibition of bail-outs in the euro area (stipulated in Article 125 of the Treaty on the Functioning of the European Union) as credible, implying a soft budget constraint problem in the euro area (see, for instance, Baskaran and Hessami, 2017). The president of the German central bank, Jens Weidmann, supports this interpretation by arguing 'that the no-bail-out clause lacked credibility [...], that might also explain why even highly-indebted member states had only very low risk premiums on their debt in the euro's first decade. Consequently, the financial markets failed to have a disciplining effect on government finances.'¹³

Default costs and member states' debt accumulation

The differences in the level of economic development in the euro area are quite large. For instance, GDP per capita in the Netherlands reached over 41 thousand euros in 2016, whereas Portugal's was below 18 thousand euros. The diverging degrees of economic development are also reflected in the member states' industry structures. For example, in 2016 agriculture's share of total gross value added was 0.6% in Germany and industry contributed 25.6%. The corresponding numbers for Greece are 4.0% and 13.4%, respectively.¹⁴ These differences in industry structures and economic development imply that the private sector costs of default should also differ between member states. In the asymmetric scenario of the theoretical analysis this leads to a situation in which regions with low default costs can free-ride on high-cost regions as the latter aim to maintain moderate borrowing costs. As a consequence, the low-cost region incurs higher debt than optimal from the union's perspective, whereas the high-cost regions keep their borrowing

13. Speech 'The euro area as a union of stability', held on October 8, 2013 (Accessed via the website of the Bundesbank on January 8, 2018: www.bundesbank.de).

14. Data are taken from Eurostat: www.ec.europa.eu/eurostat (Accessed January 9, 2018).

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inefficiently low to preserve a relatively moderate aggregate debt level, anticipating that higher debt increases the probability of default (which can be interpreted as a threat to the overall stability of the currency union).

The development of debt levels in the euro area's member states is in line with this prediction. For instance, at the introduction of the euro in 1999, Portugal's public debt was at a very moderate level (51% of GDP). The debt-to-GDP ratio then steadily increased to 96% in 2010, and soared during the crisis to 130% in 2016. Greece's debt-to-GDP ratio has been above 100% in every year of the 2000s and rocketed after the outbreak of the debt crisis to 181% of GDP in 2016. An inverse development can be observed in the cases of Germany and the Netherlands. Germany's public debt peaked in 2010 at 81% of GDP, but decreased steadily since the outbreak of the debt crisis to 68% of GDP in 2016. The Netherlands have traditionally maintained a comparatively low public debt level. Since the introduction of the euro until the outbreak of the debt crisis in 2010, the Netherlands never violated the Maastricht debt criterion of 60% of GDP. As a response to the crisis, the debt-to-GDP ratio peaked at 68% in 2014, but again decreased to 62% in 2016.¹⁵

As in the case of Argentina, it is difficult to find proof that governments are aware of the mechanism described in the asymmetric scenario and that they have deliberately considered it in their policy choices. However, at least anecdotal evidence indicates that the channels might indeed be at work in the euro area. Former German finance minister Wolfgang Schäuble argued in 2011 that the 'European Monetary Union won't succeed if a number of countries persistently run deficits [...] at the expense of the euro's stability.'¹⁶ This statement is in line with the model's prediction for the low-cost region's choices on debt accumulation.

However, more interesting is whether the conjecture can be supported that the high-cost regions incur sub-optimally low levels of debt in order to maintain the stability of the currency union as a whole. We argue that this is indeed the case. An official statement of the German government following the European Council

15. Data are taken from Eurostat: www.ec.europa.eu/eurostat (Accessed January 9, 2018).

16. Speech 'A comprehensive strategy for the stabilization of the Economic and Monetary Union', held on 18 May 2011 at the Brussels Economic Forum (Accessed via the website of the Federal Ministry of Finance on January 7, 2018: www.bundesfinanzministerium.de).

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of June 2011 describes at some length the government's efforts to bring down the public debt level and the intention to stick to the Maastricht criteria. The statement then concludes: 'With this development Germany significantly contributes to the stabilization of the euro area. Also in the future, we remain the anchor of stability in Europe (translation by the author).'¹⁷

The ambition to keep the public debt at a moderate level is in line with the implications of the model. Of course, the continuing strong performance of the German economy significantly contributes to the decrease of the debt-to-GDP ratio. Hence, the question remains whether the public debt is indeed sub-optimally low. The ongoing debate in Germany on a potential lack of public investment gives a hint that the debt level might indeed not be optimal from Germany's own perspective. In 2015, Germany spent 2.1% of GDP on public investment, which is the second lowest share in the entire euro area.¹⁸ In 2013, when Germany was still recovering from the financial crisis, the IMF's Article IV country report on the one hand emphasized that 'Germany plays an important role in stabilizing the region due to its strong balance sheets and safe haven status', but also warned that 'fiscal overperformance should be firmly avoided' and that 'planned expenditures should be accelerated, especially for public investment'.¹⁹ More recently, a commission of economic experts argued that 'Germany's investment performance in both the public and the private sector is currently quite weak' and that 'compared to other major economies, Germany's capital stock is not very modern and must be upgraded.'²⁰ Hence, the claim that an increase of debt financed public investment might be optimal for Germany appears to be justified, which is also supported by the fact that Germany can borrow at historically low interest rates.

17. Information taken from the official website of the German federal government: www.bundesregierung.de (Accessed January 7, 2018).

18. Data are taken from Eurostat: www.ec.europa.eu/eurostat (Accessed January 9, 2018).

19. Information taken from the website of the IMF: www.imf.org (Accessed January 10, 2018).

20. See 'Increasing investment in Germany: Report prepared by the expert commission on behalf of the Federal Minister of Economic Affairs and Energy', accessed via the website of the Federal Ministry for Economic Affairs and Energy on January 11, 2018: www.bmwi.de.

Policy implications

The problem of excessive sovereign debt in some member states and the question how debt management should be regulated is at the heart of the debate on how to reform the euro area architecture to make it more shock-resistant. With the experiences of the financial and debt crises in mind, proponents of further deepening of EMU argue that increased risk-sharing (for example via a euro area budget that serves as shock absorber) is crucial to make the common currency sustainable in the long-run. Critics, however, emphasize that such measures would further exacerbate moral hazard problems which are regarded as a main cause of the debt crisis in the first place. This political controversy has led to increased academic interest in the question how the euro area can be fiscally stabilized without causing politically unacceptable free-riding problems (see, for example, the discussion on a European safe asset in Brunnermeier et al., 2017).

In this context, we derive two main policy implications from the analysis. First, our model implies that more centralized borrowing in the euro area could reduce rather than increase free-riding in the monetary union. As described in the case study on the euro area, the often excessive debt levels some member states of the euro area had accumulated following the introduction of the common currency can be interpreted as free-riding by individual governments as they could expect to be bailed out through the monetary union as a whole (either fiscally by other member states or through the monetary policy of the ECB). Our analysis implies that a more centralized debt management might help to attenuate this free-riding problem and could increase the welfare of the currency union as a whole. However, increased risk-sharing would also require increased sovereignty sharing, as the capacity of individual member states to issue debt at their own discretion would have to be limited (which is of course a politically highly sensitive issue).

Second, an implication of our analysis is that the more homogeneous is the development level of industries in the currency union's member states, the weaker are the free-riding incentives as also the costs of sovereign default converge. Besides numerous other reasons, this aspect provides a political economy argument in favor of stronger economic convergence in the euro area. As discussed above, more advanced industries are more heavily depending on external capital and

therefore incur higher costs in case of sovereign default on external debt. In a federation, low-cost regions have an incentive to over-borrow at the expense of high-cost regions. This inefficiency is reduced when the costs of default for the regions of a federation converge.

2.5 Conclusion

Previous theoretical work on sovereign debt has barely analyzed the link between a country's federal design and external default risk. We aim to fill this gap by developing a sovereign debt model with an embedded federal political system. Regional governments can borrow individually while the central government decides whether to default on aggregate debt of the federation (i.e. the sum of regional debt levels). We show that decentralized borrowing leads to higher debt levels, at higher interest rates, increased default probability and lower welfare compared to a benchmark case of centralized borrowing. The inefficiency is amplified in case of diverging regional default costs: Regions with low default costs (because of their economy's relative independence from external capital) have an incentive to over-borrow at the expense of regions with higher costs. As a consequence, in order to keep aggregate debt at a moderate level, high-cost regions borrow less than socially optimal.

We discuss case studies of Argentina and the euro area to illustrate the model's assumptions and implications and finally derive policy implications, in particular with regard to euro area governance. We argue that debt mutualization (of newly issued debt) potentially decreases rather than increases moral hazard problems and that economic convergence might reduce free-riding incentives for the member states' governments.

This chapter is a first step to improve the understanding of external default risk in federations. While we focus on deriving potentially important theoretical channels, future research might analyze the relevance of these channels in a fully dynamic quantitative model. Moreover, it would be interesting to further relax assumptions made in our model. For example, Argentina provides a striking example of an unbalanced division of political and economic power between regions. Ardanaz et

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al. (2014) illustrate that Buenos Aires (city and province), Cordoba and Santa Fe are home to almost two thirds of the Argentine population and these provinces produce 71% of GDP (data from 2008). However, they only dispose of 16.7% of the representatives in the Senate. This imbalance could motivate different weights of regions in the central government's welfare function, which might further increase default risk.

3 Domestic redistribution through external default

3.1 Introduction

The 1980s have been a ‘lost decade’ for Latin America’s economic development. Debt crises haunted the region and led to an unprecedented series of sovereign defaults. While this decade marked a particularly severe episode, debt crises have plagued many Latin American countries ever since attaining independence.¹ Besides its infamous default history, pronounced income inequality has been and still is a striking characteristic of the region.² This chapter theoretically analyzes a potential connection between these phenomena. Does the distribution of income within a country affect the government’s decision to default on its external debt obligations?³ And in case of default, does income inequality affect the outcome of a debt restructuring, i.e. the size of creditor losses (‘haircuts’)?

We propose an affirmative answer to these questions. The reason is that external default does not only redistribute wealth *between* international creditors and the sovereign debtor as highlighted in most of the sovereign debt literature, but also has distributional effects *within* a defaulting country. Building on recent empirical findings on sovereign defaults, the main contribution of this chapter is to

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1. See Reinhart and Trebesch (2016) and Kaminsky and Vega-García (2016) for historical accounts of sovereign defaults.
 2. At the end of the 1980s the average Gini coefficient in Latin America was 50.0. Inequality reached an all-time high of 56.0 in the 1990s. Although the income gap in Latin America has narrowed since the beginning of the 21st century, it still remains the most unequal region in the world (see Tsounta and Osueke, 2014). In 2004, the average Gini coefficient was 52.5 in Latin America, which is 8 points higher than in Asia, 18 higher than in Eastern Europe and Central Asia, and 20 higher than in the developed countries (see Gasparini and Lustig, 2011).
 3. We refer to external debt as debt held by *foreign* creditors.

carve out a potentially important theoretical channel that rationalizes a positive correlation between the extent of income inequality and both default probability and size. Hence, our contribution is to improve the understanding of the trade-off between efficiency losses of sovereign default and domestic redistribution, a question that has found little attention in previous work.⁴ Concretely, to analyze the relation between income distribution and external default risk, we develop a formal framework building on a static public finance model and add (non-enforceable) external debt as a novel feature.⁵ This approach deviates from the traditional sovereign debt literature which focuses on representative agent models and hence cannot account for the role of income heterogeneity among domestic agents. Moreover, we do not follow the common approach of modeling default as a binary choice between complete default and full repayment. In line with real-world sovereign debt crises, we treat creditor losses as a continuous variable which represents partial defaults. As our analysis focuses on domestic distributive aspects of default, allowing for a partial default is helpful as it captures the ‘size of the cake’ which can be redistributed. Finally, we assume that the government is not benevolent but opportunistic in the sense that it follows the median household’s preferred policy.

More specifically, our theoretical line of argument goes as follows. Households face a trade-off: On the one hand, default on debt held by foreign creditors is costly because the domestic private sector suffers from deteriorating external financing conditions. This leads to inefficiencies in production which cause a drop in output. The output loss is increasing in haircut size as higher haircuts lead to worse financing conditions and longer capital market exclusion. On the other hand, default benefits households since resources initially earmarked for debt service can be reallocated to public spending. Households are asymmetrically affected by a default depending on their relative income position within society. We show

4. Although related to the classic sovereign debt literature in the tradition of Eaton and Gersovitz (1981), this chapter is not a contribution to research on debt dynamics. Instead of studying debt accumulation, default frequencies and market access over time, we analyze the role of domestic distributive incentives on a government’s decision to default for a given level of debt at a given point of time. As a consequence, studying the impact of income inequality on debt dynamics is beyond the scope of this chapter.

5. This class of models is particularly suited to study distributional policies. See Persson and Tabellini (2000) and Acemoglu and Robinson (2005) for extensive discussions.

that the households' preferences for default are inversely ordered by income, i.e. the higher a household's income share, the lower the preferred haircut. This is because the larger is a household's share of overall income the more painful is the output loss associated with a marginal increase of the haircut size. Conversely, a relatively poor household prefers a higher haircut as the utility loss from a reduction in output is small compared to the benefit of additional government spending. The policy finally implemented depends on the political regime. We show that, compared to a social planner, an opportunistic government within a median voter framework is more prone to default.

The chapter is organized as follows. Section 3.2 presents evidence that motivates our work and discusses related theoretical research. We develop the formal framework and discuss the model's implications in Section 3.3. Section 3.4 concludes.

3.2 Motivating evidence and related literature

In the following, we first present the evidence that motivates our argument. We then discuss related research on economic and political determinants of default and describe how our analysis departs from this work.

3.2.1 Motivating evidence

A relation between income distribution and sovereign risk has already been identified in the 1980s. In an early empirical study on the determinants of external default, Berg and Sachs (1988) argue that their 'most striking finding is that higher income inequality is a significant predictor of a higher probability of debt rescheduling [...] (p. 271). They conclude that regarding the frequency of sovereign defaults 'Latin American countries rank near the very top [...] while the East Asian economies are near the bottom' (p. 289). The latter countries are traditionally characterized by low income inequality, whereas Latin America is the most unequal region in the world (see Gasparini and Lustig, 2011, and Tsounta and Osueke, 2014). Surprisingly, these findings only had little impact on the theoretical sovereign debt literature.

Recent studies confirm the findings of Berg and Sachs (1988). Based on a panel dataset of 56 countries ranging from 1994-2010, Jeon and Kabukcuoglu (2016) find

a negative correlation between income inequality and sovereign credit ratings.⁶ In a similar vein, and using data from 50 countries, Aizenman and Jinjark (2012) find that an increase in the Gini index by one point (on a scale of 0-100) is associated with a higher sovereign spread of 45 basis points.

Regarding private households' preferences for default, evidence from public opinion polls supports the conjecture that the position within a society's income spectrum plays an important role for citizens' attitude towards sovereign default on external debt. Tomz (2002) administered a survey in Argentina during the debt crisis of 2001-2002 and found that poor and unemployed citizens were less likely to support repayment than those with greater assets and more job security. Curtis et al. (2014) provide similar findings. They analyze the 2011 referendum on debt repayment in Iceland, the so called 'Icesave' referendum. This referendum took place in the wake of the severe banking crisis in Iceland and constitutes the only occasion in which the population was asked to vote directly on sovereign debt resettlement terms. They find that the income position within society indeed affects preferences for debt repayment: Citizens with extensive investment assets voted for repayment, whereas the unemployed tended to vote against repayment. This preliminary evidence hints at potentially important domestic distributional effects of external default.

3.2.2 The economics of sovereign default

The sovereign debt literature has paid comparatively little attention to the impact of domestic distributional conflict on external default. This mainly results from its focus on representative agent models. The classic approach to sovereign default dates back to the seminal work by Eaton and Gersovitz (1981) and has been refined, among others, by Aguiar and Gopinath (2006) and Arellano (2008).⁷ In these models, a benevolent government that maximizes the representative agent's welfare faces the following trade-off: On the one hand, default is beneficial since it serves as insurance mechanism against adverse output shocks. On the other hand,

6. In the literature, sovereign bond ratings are widely used as predictors of default (see Reinhart, 2002, and Reinhart et al., 2003).

7. For recent surveys of the theoretical and empirical literature on sovereign debt, see Aguiar and Amador (2014) and Tomz and Wright (2013), respectively.

non-repayment is costly due to temporary capital market exclusion and, in most models, additional output losses.⁸ This approach to external default is apolitical in the sense that it exclusively focuses on economic incentives for default and does not take into account two important political factors: Domestic distributional conflict and the government's regime type. However, these aspects are considered more and more important for the understanding of sovereign default.⁹ Tomz and Wright (2007) have shown that the standard model is unable to fit historical default episodes in a satisfactory way and argue that 'a model of default that includes not only economic but also political shocks [...] could account for significantly more of the historical record than models that are currently available' (p. 359).

3.2.3 Political determinants of default

The impact of domestic distributional conflict on sovereign risk has found relatively little attention in the literature. Some work has analyzed distributional consequences of default on *domestic* debt (e.g. Tabellini, 1991, Dixit and Londregan, 2000). In a recent paper, D'Erasmus and Mendoza (2016) argue that domestic default can be optimal when domestic debt is high enough and its ownership is sufficiently concentrated. This paper differs from our work as we consider external debt and the government is not utilitarian.

Some recent research has also focused on the relation between external debt and heterogeneity among domestic agents. Ferriere (2015) investigates the interaction between the incentive to default and the distributional cost of taxes in a standard sovereign debt model with heterogeneous agents, progressive taxation, and elastic

8. More generally, the starting point of the literature is the question why sovereign debt can exist at all since claims by creditors are not (or hardly) legally enforceable. A large body of research is devoted to this question, in particular to the identification of default costs that might explain why governments ever repay foreign debt. Many sources of default costs have been discussed in the literature. Traditional explanations refer to capital market exclusion (Eaton and Gersovitz, 1981), sanctions like trade embargos (Bulow and Rogoff, 1989), and reputational spillovers (Cole and Kehoe, 1998). More recent work discusses informational costs (Andreasen, 2015 and Sandleris, 2008) and adverse spillovers of sovereign default to the private sector as important sources of default costs (Arteta and Hale, 2008, and Kohlscheen and O'Connell, 2008). Borensztein and Panizza (2009) and Panizza et al. (2009) provide overviews on sources of default costs.

9. For a review of the literature on 'political defaults', see Hatchondo et al. (2009) and Hatchondo and Martinez (2010).

labor supply. She finds that committing to a more progressive tax system that reduces after-tax inequality is an effective policy tool to reduce sovereign credit spreads in highly indebted countries. In contrast to this chapter, her focus is on the design of the tax system and she considers a utilitarian government. Cusato Novelli (2017) studies sovereign default in an economy in which self-interested and myopic political parties bargain over the budget. He shows that countries with a higher degree of political instability and fragmentation are more likely to default. Whereas Cusato Novelli (2017) focuses on competition between political parties and its effect on default, we investigate the role of income distribution among domestic households for an opportunistic government's policy choice. DAVIS et al. (2016) study redistributive policies in an overlapping generations model without commitment in which the government's incentive to accumulate external debt is affected by inequality. The equilibrium dynamics in their model resemble the populist cycles documented in many developing countries – generous public spending on transfers followed by austerity. Whereas DAVIS et al. (2016) remain silent on size and likelihood of default as a consequence of inequality, these aspects are the main focus of our work.

Also the role of regime type – autocratic versus democratic – is not well understood. As pointed out by Andreasen et al. (2016), standard sovereign debt models implicitly assume an autocratic regime because governments can always implement the policies they desire to without facing any kind of resource or political constraint. Guembel and Sussman (2009) argue that the 'source of the theoretical difficulty (the debt enforcement problem, comment by the author) is not just the absent property rights but also the representative agent assumption that has dominated the literature so far' (p. 1297). They develop a political economy model and find that once this assumption is given up there may be an incentive for the government to repay its debt even in the absence of default penalties. In our model, we also depart from the assumption of a social planner maximizing a representative agent's welfare. However, in contrast to the work by Guembel and Sussman (2009), in this chapter default is costly and domestic bondholders are absent.

Whereas the role of regime type has been neglected in the economics literature on sovereign risk, political scientists study the subject within the debate on the 'democratic advantage' (see North and Weingast, 1989, and Schultz and Weingast,

2003). The basic idea is that voters want their government to generally comply with international agreements. Hence, democratic institutions should be able to impose stronger constraints on the government and thus make repayment promises by democracies more credible as compared to autocratic regimes. As a consequence, democratic institutions should allow for higher debt levels and lower borrowing costs.

However, the argument is not uncontested. Saiegh (2005) finds that democracies are *more* likely to reschedule their debt, and paid interest rates are at least as high as in autocracies. DiGiuseppe and Shea (2016) analyze the influence of sovereign borrowing on leader survival and find that authoritarian regimes are more likely to use debt-financed policies to ensure political survival than democracies. Enderlein et al. (2008) analyze whether regime type matters for government behavior during debt restructurings. They find that, conditional on default, democracies behave more aggressively than autocracies during debt renegotiations. A potential explanation for this result might be that in a situation of financial distress voters choose to constrain governments in order to *avoid* compliance with international creditors because a default's benefit outweighs its cost. Tomz (2002) also provides evidence that compliance depends on the state of the economy. He shows that the majority of Argentine citizens preferred to repay the external debt in 1999 but opted for default in 2001. He argues that 'after a three-year economic recession that showed no signs of abating, citizens would no longer tolerate government spending cuts and tax increases' (p. 13). This change of attitude towards debt repayment is in line with the argument that agents only prefer to comply with international agreements when it is deemed optimal from an economic point of view. Research has also focused on the question how different democratic regimes behave towards debt repayment. Saiegh (2009) shows that coalition governments default less often than unified ones. An empirical study by van Rijckeghem and Weder (2009) reveals that parliamentary regimes pay their debt more often than other types of democracies.

In our model, we analyze the impact of domestic distributional conflict on an opportunistic government's decision to default on external debt obligations. The median voter setting is an inherently democratic one which therefore allows to analyze how the decision on default differs from the (autocratic) social planner approach.

3.3 The model

Consider an economy with a finite set $N = \{1, \dots, n\}$ of households, where n is odd. Households differ in income. Parameter α_i represents household i 's share of aggregate output y where $\alpha_1 \leq \alpha_2 \leq \dots \leq \alpha_n$, and $\sum_{i=1}^n \alpha_i = 1$. The median household's income share α_m (where $m = \frac{n+1}{2}$) is below average income: $\alpha_m < \bar{\alpha} = n^{-1}$, so the income distribution is skewed to the right. This assumption is consistent with evidence from virtually every country.

The government inherits an exogenous amount of sovereign debt d which is held by foreign creditors. In line with most of the literature, d is not subject to external enforcement. We exclude the possibility of debt rollover, so the government must either fully repay or (partially) default on the debt.

The economy is endowed with income $y(h) = \theta f(h)$ where θ is an exogenous, stochastic income component and $\theta > 0$. Variable h captures the haircut size. It is continuous and defined over the interval $[0, 1]$, where $h = 0$ represents full debt service as stipulated in the debt contract and $h = 1$ indicates a complete default on debt. Values within the interval capture the percentage of investor losses and hence can be interpreted as the outcome of a partial default. Moreover, we assume $f(0) = 1$ and $f(1) > 0$, so θ represents the level of output in the absence of default and overall output y is strictly positive in case of complete default. The government can freely set h which illustrates the country's complete discretion over debt repayment.¹⁰ Function $f(h)$ is decreasing and concave ($f'(h) < 0$ and $f''(h) < 0$ within the entire domain) in the government's choice variable h . This functional form captures the output cost of default and is derived from recent empirical findings. In the following, we discuss the assumptions made on the functional form in more detail since it is crucial for the trade-off we analyze in this chapter.

10. This assumes that creditors have no bargaining power which is in line with the traditional approach. However, some authors have started to explicitly model the renegotiation process as a Nash bargaining game (e.g. Benjamin and Wright, 2013, and Yue, 2010).

3.3.1 Haircut size and output loss

The assumptions made on the functional form of the endowment process are motivated both by recent empirical findings and advances in theoretical work on sovereign default. First, and in line with the literature, default is costly as it leads to output losses. Modeling the cost of default as an exogenous reduction of output has become common practice in sovereign debt models (see, among others, Aguiar and Gopinath, 2006, and Arellano, 2008). However, these exogenous drops in output have been criticized for their ad-hoc nature. Mendoza and Yue (2012) endogenize the output cost of external default and provide an economic rationale for the drop in GDP. They apply a general equilibrium setting to a sovereign debt model in order to link default with private sector activity. In their model, sovereign default leads to capital market exclusion of both the public *and* the private sector. External capital is needed by private firms to pay for imported inputs which can only be imperfectly substituted with domestic goods. Hence, sovereign default causes an efficiency loss in domestic production which leads to an endogenous output cost. The crucial assumption that sovereign default has adverse effects on private sector access to capital markets is supported by empirical studies by Arteta and Hale (2008), Kohlscheen and O'Connell (2008).

Second, the output loss is increasing in haircut size ($f'(h) < 0$), an assumption that we share with Arellano et al. (2013) who are the first to allow for partial defaults in a dynamic sovereign debt model. Recent research by Cruces and Trebesch (2013) and Trebesch and Zabel (2017) provides a justification for this assumption. They show that higher haircuts are associated with significantly higher subsequent sovereign bond yield spreads, longer periods of capital market exclusion and larger drops in output. By linking the argument of Mendoza and Yue (2012) with the findings of Cruces and Trebesch (2013), we argue that the output loss of default is increasing in haircut size: A higher haircut leads to an extended period of capital market exclusion which in turn prolongs inefficiencies of production in the private sector and therefore causes larger cumulated output losses.

Third, the marginal output loss of default is increasing in the exogenous component of output: $\frac{\partial^2 y}{\partial h \partial \theta} = f'(h) < 0$. This implies that default is more costly in

good states of the economy. Arellano (2008) shows that this assumption is crucial to generate government default incentives that trigger default in bad states, at non-negligible debt ratios, and at realistic default frequencies. Again, Mendoza and Yue (2012) provide an economic justification for this assumption. Their analysis of the link between sovereign default and private sector credit conditions yields that the output cost of default is an increasing function of total factor productivity. Our specification of the endowment process is in line with that finding because, although there is no production in our model, the exogenous output component θ can be interpreted as a proxy for total factor productivity.¹¹

The timing of output realization is as follows. First, θ is realized and observed by the households who then determine their respective preferred haircut size h_i^* (which can of course be zero). Next, the government implements the median voter's preferred haircut size h_m^* and the final level of output y is realized and distributed among households.

11. Also note that, since there is no domestic debt in our model, we implicitly assume that the government can 'target' a default on foreigners. Guembel and Sussman (2009) and Broner et al. (2010) question the ability of governments to discriminate between domestic and foreign bondholders. The latter argue that discrimination is impossible in the presence of secondary markets because foreigners can sell bonds to domestic agents thereby transforming foreign to domestic debt. Note, however, that our specification of the endowment process does not depend on the assumption of discriminatory default. What would happen in case of non-discrimination? As pointed out by Acharya and Rajan (2013) and Gennaioli et al. (2014), default would destroy the balance sheets of domestic banks leading to a credit crunch that adversely affects the domestic private sector. Hence, there is a negative impact on the domestic private sector's financing conditions in both the discriminatory and the non-discriminatory scenario.

3.3.2 The household's problem

Households have preferences over private and public consumption which are represented by the following linear utility function:

$$u(c_i, g) = c_i + g$$

where c_i represents private consumption of household i . Government spending g is provided in the same, nonnegative, amount to every household: $g \geq 0$. The private budget constraint is given by

$$c_i = (1 - \tau) \alpha_i y(h)$$

where τ is the income tax rate which is common for all income classes. The (per capita) government budget constraint is given by

$$g = [\tau y(h) - (1 - h)d]n^{-1}$$

where d is the exogenous stock of external debt. Since we use a static model to carve out the distributional aspect of default as clearly as possible, we can abstract from the effect of savings and interest payments on d . Taxes are used to finance government spending g . In addition, the budget constraint implies that default on external debt d enables the government to expand the scope of public spending since resources initially earmarked for debt service are made available. Since we want to focus on a 'willingness to pay' problem we must assume $\tau\theta - d \geq 0$ such that the government would be *able* to repay the due debt, but might not deem it optimal to do so.

Households do not make a direct decision in the model, but depending on the political process, the preferences of a pivotal household decide over debt repayment. Hence, in a first step, we derive the respective households' most preferred choice to understand which factors determine a household's preferences regarding default. Depending on the income share α_i , a household's most preferred haircut size can

be derived as follows:

$$\max_h u_i(h) = (1 - \tau) \alpha_i y(h) + \bar{\alpha} [\tau y(h) - (1 - h) d],$$

where $u_i(h)$ represents household i 's utility as a function of haircut size h . Under the assumptions made on $y(h)$, $u_i(h)$ is strictly concave and twice continuously differentiable in h . The Kuhn-Tucker first order conditions imply that

$$[(1 - \tau) \alpha_i + \tau \bar{\alpha}] \theta f'(h) + \bar{\alpha} d \leq 0 \text{ for } h = 0 \quad (1)$$

$$[(1 - \tau) \alpha_i + \tau \bar{\alpha}] \theta f'(h) + \bar{\alpha} d = 0 \text{ for } h > 0 \quad (2)$$

The first-order conditions illustrate the household's trade-off when it comes to the determination of its most preferred policy choice.¹² Consider the two terms contained in the FOCs. The first term $[(1 - \tau) \alpha_i + \tau \bar{\alpha}] \theta f'(h)$ represents the marginal cost of default since the output loss is increasing in haircut size (remember that $f'(h) < 0$). The second term $\bar{\alpha} d$ is the marginal benefit of default because the higher the haircut size the more resources are made available for public spending. Thus, each household trades off the deadweight output loss of a haircut against the redistributive benefit of increased public spending.

In case of the corner solution $h = 0$, the cost of default outweighs the benefit, so full repayment is the optimal choice. Solving Equation 1 for θ yields a first result which relates default to the overall economic situation. We obtain

$$\theta \geq - \frac{\bar{\alpha} d}{[(1 - \tau) \alpha_i + \tau \bar{\alpha}] f'(0)}$$

This result implies that default is only an optimal choice from household i 's perspective when θ falls below this threshold. If the exogenous output component θ is above the threshold, then $h_i^* = 0$ and hence full debt service is optimal from household i 's perspective.

12. The second order condition is given by $[(1 - \tau) \alpha_i + \tau \bar{\alpha}] \theta f''(h) < 0$.

Result 1. If $\theta \geq -\frac{\bar{\alpha}d}{[(1-\tau)\alpha_i + \tau\bar{\alpha}]f'(0)}$, full repayment ($h = 0$) is optimal from household i 's perspective.

This result is consistent with the usual argument in the literature that default occurs in states of the economy when output is low (see Aguiar and Gopinath, 2006, Levy-Yeyati and Panizza, 2011, and Tomz and Wright, 2007).

3.3.3 Comparative statics

We now analyze the case in which full repayment is not optimal (i.e. we consider the interior solution $h_i^* > 0$) and explore how changes in the exogenous variables affect the size of default. The preferred haircut size is a function of a household's income share α_i , the exogenous income component θ , debt level d , and tax rate τ : $h_i^* = f(\alpha_i, \theta, d, \tau)$.

Proposition 1. An increase in household i 's income share α_i implies a lower preferred haircut size h_i^* : $\frac{\partial h_i^*}{\partial \alpha_i} < 0$.

Proof. Consider Equation 2 and recall that both $f'(h) < 0$ and $f''(h) < 0$. Applying the implicit function theorem yields

$$\frac{\partial h_i^*}{\partial \alpha_i} = -\frac{(1-\tau)f'(h)}{[(1-\tau)\alpha_i + \tau\bar{\alpha}]f''(h)} < 0$$

□

This is the core result of our analysis. The optimal default size is inversely ordered by the households' income. The economic rationale is that the higher is a household's share of overall income the more painful is a marginal increase of the haircut due to the output loss induced by default. The richer a household the less it can be compensated by the increase in public spending. A relatively poor household, on the other hand, prefers a higher default as the utility loss from a reduction in output is small compared to the benefit of additional government spending.

Interestingly, this chapter's theoretical implication is in the spirit of Meltzer and Richard's (1981) seminal work on the 'size of government'. They show that

more unequal societies tend to have larger welfare spending since the median voter demands more redistribution the more distant her income is from average income. Analogous to Meltzer and Richard (1981), we find that the lower an individual's income, the higher is her demand for redistribution, in our case the preferred haircut size. Whereas the distortionary character of taxes limits the extent of transfers in Meltzer and Richard's (1981) work, the output loss of default sets a limit to redistribution in our model. Hence, external default can serve as an instrument for domestic redistribution. Persson and Tabellini (1994) and Alesina and Rodrik (1994) describe a similar channel in their work on the effect of income inequality on economic growth. They argue that income inequality exerts a negative effect on growth, because it provides stronger incentives for redistributive policies, which hurt growth-promoting investment. The effects of the exogenous output component θ and debt level d on the haircut choice are summarized in the following Proposition.

Proposition 2. *Household i 's preferred haircut size h_i^* is increasing in debt level d and decreasing in the exogenous output component θ :*

$$\frac{\partial h_i^*}{\partial d} > 0; \quad \frac{\partial h_i^*}{\partial \theta} < 0.$$

Proof. The proof is similar to the one of Proposition 1. We obtain

$$\frac{\partial h_i^*}{\partial d} = -\frac{\bar{\alpha}}{[(1-\tau)\alpha_i + \tau\bar{\alpha}]\theta f''(h)} > 0 \quad \text{and} \quad \frac{\partial h_i^*}{\partial \theta} = -\frac{f'(h)}{\theta f''(h)} < 0$$

□

These results are consistent with established stylized facts of the sovereign debt literature. In our model, marginally increasing the haircut size h becomes more and more attractive for the government the higher is debt level d . This is because more resources can be re-allocated to public consumption. This finding is in line with the stylized fact that higher debt levels make default more likely (see Panizza et al., 2009). As already discussed within the context of Result 1, the inverse relation between default (size) and output is consistent with the stylized fact that defaults usually occur in 'bad times'.

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When it comes to the effect of an increase of the income tax on a household's preferred haircut size, the result is ambiguous.

Proposition 3. *A higher income tax rate τ implies a higher (lower) preferred haircut size h_i^* if a household has above (below) average income $\bar{\alpha}$:*

$$\frac{\partial h_i^*}{\partial \tau} > 0 \text{ if } \alpha_i > \bar{\alpha}; \quad \frac{\partial h_i^*}{\partial \tau} < 0 \text{ if } \alpha_i < \bar{\alpha}.$$

Proof. Again, proceeding as in Proposition 1, we obtain

$$\frac{\partial h_i^*}{\partial \tau} = \frac{(\alpha_i - \bar{\alpha}) f'(h)}{[(1 - \tau)\alpha_i + \tau\bar{\alpha}] f''(h)}$$

This implies that if $\alpha_i > \bar{\alpha}$, then $h_i^*(\tau) > 0$. And, conversely, if $\alpha_i < \bar{\alpha}$, then $h_i^*(\tau) < 0$. \square

In the model, taxes are non-distortionary and therefore a tax increase simply reduces income heterogeneity by shifting resources from private to public consumption (which are perfect substitutes for households). As a result, a higher tax level leads to a convergence of the (conflicting) interests of rich and poor households: In case of a tax increase, high income households prefer a *higher* haircut and vice versa.

3.3.4 Political process and default decision

The political process determines how the conflicting preferences over default translate into policy. We first derive the solution for a social planner who maximizes a representative agents' utility. This is the approach usually chosen in sovereign debt models. Since utility is linear in both private and public consumption, maximizing the utility of the household with *average* income coincides with the social planner solution for the representative agent:

$$h_{\bar{\alpha}}^* = \arg \max U(h)$$

where $U(h) = \sum_{i=1}^n u_i(h)$ is the sum over all households' utility.

Departing from the social planner assumption and allowing for an opportunistic government shows that income distribution has a direct effect on the default decision. In that case the equilibrium haircut is the policy the *median* income household prefers. Combining our central finding that a higher income share leads to a lower preferred haircut ($\frac{\partial h_i^*}{\partial \alpha_i} < 0$) and the assumption that median income is below average income ($\alpha_M < \bar{\alpha}$) yields the conclusion that a departure of the median household's income share from the one of the average income household increases likelihood and size of default.¹³ Compared to the social planner, an opportunistic government is more prone to default when the income distribution is skewed to the right.

The model predicts that societies with a relatively wealthy middle class (the median voters) are less likely to default on external debt. Also note that the kind of inequality matters. On the one hand, if inequality increases because the middle class gets relatively richer due to an income decline of the poorest, the likelihood of default decreases. On the other hand, if income is more concentrated at the top (thereby reducing relative income of the middle class), the equilibrium default likelihood and size increase.

Our analysis can help to better understand under which circumstances democratic regimes tend to default. Contrary to the claim that voters always want their government to comply with international agreements as argued within the 'democratic advantage' debate (e.g. Schultz and Weingast, 2003), we show that agents decide on whether to comply or not conditional on their economic situation.

We do not provide any insight on the default behavior of autocratic regimes in which citizens are unable to implement their political preferences. Acemoglu and Robinson (2005) argue that 'there is often a close association between what nondemocratic regimes do and what the rich want'. If this argument also holds for decisions on debt repayment we would expect to observe fewer defaults and smaller haircuts in countries which are run by autocratic regimes. However, evidence remains inconclusive on the question whether autocratic or democratic regimes obtain more favorable credit conditions (see Beaulieu et al., 2012).

13. Note that the median voter theorem applies since the policy space is one-dimensional and the households' preferences over haircut size are single-peaked: $\frac{\partial h_i^*}{\partial \alpha_i} < 0$.

3.4 Conclusion

This chapter theoretically analyzes how domestic distributional conflict resulting from income inequality affects a government's decision to default on its external debt obligations. We show that the larger is the distance between median and average income, the more a country tends to default on its external debt. Historical evidence is in line with this finding. We argue that this is because external default can serve as a redistributive policy similar to a distortionary income tax à la Meltzer and Richard (1981) as the output cost of default is mainly incurred by high-income households, whereas relatively poor ones benefit due to potentially smaller public spending cuts. Our analysis implies that heterogeneity among domestic agents and the nature of the political process are important determinants of sovereign risk, aspects that have found comparatively little attention in the sovereign debt literature.

The main objective of this chapter is to improve the understanding of the trade-off between efficiency losses of sovereign default and domestic distributional concerns. We have chosen a static approach in order to carve out the interaction between income inequality and the government's incentives to default for a given level of debt at a given point in time. As a consequence, studying the impact of income inequality on debt dynamics is beyond the scope of this chapter and is left to future research.

This chapter focuses on income inequality, but heterogeneity along other dimensions might also be worth investigating. We think that departing from the assumption of a benevolent government maximizing a representative agent's utility may yield further interesting questions for future research on politico-economic factors of sovereign default. For instance, one might consider the effect of a country's federal fiscal design on sovereign risk. Due to its history of sovereign defaults, quantitative dynamic sovereign debt models are frequently calibrated to Argentine data. But these models usually ignore the federal fiscal structure of a country. Interestingly, however, research on fiscal federalism identifies the inefficient allocation of taxing and spending competences among different layers of government as a main culprit for the notorious debt problems of Argentina.

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Hence, future work should investigate the interaction between the federal fiscal architecture of a country and the accumulation of sovereign debt in more detail.

It also appears sensible to consider scenarios in which the government follows own objectives which differ from the population's preferences. For instance, it might want to repay debt in order to maintain access to international capital markets although default would be optimal from a society's welfare perspective. Reasons for this might be that the government wants to finance special-interest projects. Or, in line with the reasoning of Cole and Kehoe (1998), by avoiding default, the government might want to keep up its reputation in other arenas of international relations.

4 Reform support in times of crisis: The role of family ties

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4.1 Introduction

The Great Recession and the subsequent sovereign debt crisis have triggered the most severe economic downturn in several southern European countries since World War II. Unemployment, especially among the young, reached extremely high levels in the 'crisis countries'.¹ While southern European labor markets are traditionally characterized by high youth unemployment rates, the Spanish rate of 56 percent in 2013 was nevertheless unprecedented. The data for Italy and Portugal are staggering too, reaching rates around 40 percent. These statistics illustrate severe structural problems which had been attenuated during the boom of the early 2000s. Despite revealing these problems, the crisis has not led to substantial liberalizing reforms in these countries. The Heritage Foundation's Index of Economic Freedom shows a stagnation in 'labor freedom' in the crisis countries during the period 2007–2014.² This lack of reform is puzzling as a

1. In the following, when we refer to 'crisis countries', we think of Italy, Portugal, and Spain. We consider the case of Greece as too specific, in particular due to the continuous macroeconomic surveillance by the EU and the IMF and the sovereign default in March 2012.

2. This index is a widely used measure of economic freedom (for example in Gassebner et al., 2011). See Section 4.2 and the Appendix for a detailed description of the index and the other data sources that we refer to in this section.

sizable body of research in political economics argues that crises should facilitate economic reform. The alleged inverse relation between the state of an economy and a society's willingness to reform has been coined the 'crisis hypothesis' (see, among others, Drazen and Easterly, 2001). Rodrik (1996, p. 27) even claims a tautological relation between crisis and reform: '[T]hat policy reform should follow crisis [...] is no more surprising than smoke following fire.' The limited reform effort in the crisis countries is at odds with the prediction of the crisis hypothesis. To paraphrase Rodrik (1996), there is fire, but where is the smoke?

In this chapter, we describe a mechanism that rationalizes this lack of comprehensive reform. We argue that an important determinant of a society's willingness to reform has been neglected in the literature: family ties, specifically altruistic links between parents and their working-age children. These links are particularly strong in southern Europe, a fact that has long been highlighted in sociological research (see, for example, Reher, 1998) and is confirmed by the results of the 'World Values Survey' (see, for instance, Alesina and Giuliano, 2011). In a political economy model, we show that family ties and the resulting intra-family transfers can affect voting behavior in a way that makes resistance to reform particularly strong in times of crisis.

To provide a concrete illustration of the mechanism that relates intra-family altruism and voting behavior, we consider a labor market reform within an insider-outsider framework. We think of reforms as measures that cut back employment protection, for instance a reduction of severance pay requirements. On the one hand, such reforms lead to lower wages and/or higher risk of job loss for established insiders. On the other hand, reform incentivizes firms to hire workers, thereby increasing overall employment. The strong distinction between one insider and one outsider group is for illustration purposes only. In line with the literature (Lindbeck and Snower, 2002, Bentolila et al., 2012) we think of outsiders as those who do not have access to protected jobs with above-equilibrium wages. This group includes the unemployed, the underemployed, the fully employed on temporary contracts as well as low-wage earners.

As a first step, we develop a benchmark scenario without altruism: the individualistic case. In this scenario all outsiders are in favor of reform whereas all insiders oppose it and thus the rationale of the crisis hypothesis applies: if the

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economic situation deteriorates, the share of outsiders rises and so does support for reform. Next, we extend the model by introducing intra-family altruism. We first assume that agents value their family members' well-being as strongly as their own: the completely altruistic case. In this scenario it can occur that outsiders who would prefer reform in the absence of altruism now vote against it as they take into account the effect of reform on their family members. Consider a 'mixed family' that consists of one insider and one outsider. Reform jeopardizes the insider's income but improves the job perspectives of the outsider who could become an insider in case of reform. We show that, depending on the degree of altruism, the family member who is an outsider votes in favor of reform only if the improvement in employment perspectives is sufficiently good. If the outlook is not good enough, the outsider also prefers to preserve the status quo which ensures one high and secure insider income that can be shared between family members via transfers. If, however, the chances for the outsider family member to obtain an insider job through reform are relatively good, the insider family member might even support reform. Thus, strong family ties do not necessarily reduce support for reform, yet they substantially alter the relation between economic circumstances and support for reform.

This is our key insight: the implication of the crisis hypothesis might be reversed in the presence of intra-family altruism — in times of crisis opposition to the implementation of reform is strong whereas good economic circumstances might even encourage reform. This is the case even though we model the net social benefit of reform to be higher in times of crisis than in better times. In addition, we show that the crisis hypothesis still fails when family ties are weaker than in the completely altruistic case.

Whereas the preceding findings are derived under risk neutrality we introduce risk-aversion in a next step and show that it further strengthens opposition to reform. Moreover, risk aversion allows us to analyze the role of wealth as a further source of intra-family transfers. In fact, median net wealth in the crisis countries is much higher than in many other euro area countries (see the ECB's Eurosystem Household Finance and Consumption Network, 2013). In our model with family ties, the effect of wealth on mixed families' support for reform is ambiguous. On the one hand, wealth provides some insurance against reduced family income. On

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the other hand, however, wealthy mixed families are less in need of generating additional income from a second insider job and are thus more reluctant to support reform. The effect leading to reform fatigue dominates at high levels of wealth. Moreover, an unequal distribution of wealth can further strengthen resistance to reform.

This chapter is mainly related to work on the political economy of reform and to the literature on the economic effects of family ties.³ In their seminal contributions, Alesina and Drazen (1991) and Fernandez and Rodrik (1991) explain delays in and non-adoption of beneficial reforms as the consequence of distributional conflict between competing interest groups.⁴ The growing interest in the economics of family ties mainly stems from the seminal contributions of Alesina and Giuliano (2010, 2011, 2014) who empirically investigate the impact of family ties on economic outcomes. They find that strong family ties tend to create various inefficiencies in the economy.⁵ Several papers explore the link between family ties and the regulation of labor markets. Alesina et al. (2015) rationalize the observed correlation between the intensity of family ties and employment protection by arguing that agents in societies with strong family ties are less mobile and therefore choose more regulated labor markets to avoid exploitation by monopsonic firms. Fogli (2004) argues that in an economy with credit constrained young agents, these choose to live at home longer in order to smooth consumption. Since consumption inside the household has a public good component, labor market regulation that increases the income of the old generation can be welfare improving and these potential gains are larger in countries characterized by a larger family size. Neugart (2008) analyzes how the size of intra-household transfers affects preferences for employment protection legislation of those voters who are out-of-the labor force

3. See Sturzenegger and Tommasi (1998) for an essay collection of the most relevant papers on the political economy of reform and Rodrik (1996) for a review of the literature. Alesina and Giuliano (2014) survey recent work on the impact of family ties on economic outcomes.

4. Also see Drazen and Easterly (2001), Pitlik and Wirth (2003), Alesina et al. (2006) and Agnello et al. (2015) for empirical papers in the field.

5. Daniele and Geys (2016) question whether family ties generally have a negative effect on economic outcomes and show that this relation only holds for advanced economies. Ljunge (2015) provides evidence that stronger family ties are associated with stronger civic virtues that might in turn lead to better functioning institutions and improved economic outcomes.

but have an employed spouse. He finds that in countries where this voter group is relatively large, labor regulation is comparatively strict. These papers differ from our work in one crucial aspect. They analyze the relation between family ties and the level of labor market regulation, independent of a country's state of the economy. We, however, focus on the question how the interaction of intra-family altruism and the economic situation affects support for changes in labor market regulation. Reher (1998) emphasizes the divide between central/northern Europe and the Mediterranean region regarding the intensity of family ties. Bentolila and Ichino (2008) build on this finding to show that intra-family transfers work as unemployment insurance in southern Europe whereas northern European countries rely on state provided insurance systems.

While this chapter is mainly a contribution to the political economy of reform, it is also related to labor economics as it builds on insider-outsider theory (Lindbeck and Snower, 1984, 1986, 2002). Bentolila et al. (2012) provide a detailed analysis of labor market dualism in Spain which is the real-world labor market that motivates our model. Di Cintio and Grassi (2015) show in an efficiency wage framework where market dualism arises endogenously that hiring and firing restrictions increase the use of flexible contracts and raise the wage differential. Grüner (2013) analyzes the sustainability of structural reforms in Spain and Italy within a political economy framework and highlights the politically pivotal role of insider employees. Finally, this chapter is related to the literature that tries to explain cross-country differences in employment protection. Saint-Paul (2002) and Brügemann (2012) analyze models in which employment protection creates its own support. These models give rise to multiple equilibria and can thus rationalize the cross country differences in labor market policies.

The chapter is organized as follows. Section 4.2 provides the empirical observations that motivate our work. The model setup is developed in Section 4.3. We then derive the effect of altruism on reform support in Section 4.4 and analyze the impact of wealth in Section 4.5. In Section 4.6, we discuss policy implications. Section 4.7 concludes. The Appendix provides a detailed sensitivity analysis and discussion of assumptions. Moreover, the Appendix reports details about mathematical derivations and data sources.

4.2 Motivating evidence

This section presents the empirical evidence that motivates this chapter. We first describe the employment situation in the crisis countries since 2005 and then present data showing that efforts to reform have been weak. Finally, we provide evidence from the World Values Survey confirming that family ties in the affected countries are strong.

The severe impact of the economic downturn since 2008 is most evident in labor market data, especially for the age cohort 15–24. As shown in Figure 4.1, youth unemployment has increased dramatically reaching rates around 40 percent in Italy and Portugal and a staggering 56 percent in Spain, whereas it remained almost stable in other euro area countries. The overall unemployment rates are critical, too. The figures for 2014 are 12.7 percent, 14.1 percent, and 24.5 percent in Italy, Portugal, and Spain, respectively.⁶ Besides this substantial rise in unemployment, also the other outsider groups have significantly grown during the crisis. In Spain, for instance, the share of involuntary part-time work in total employment rose from 4.3 percent in 2008 to 10.3 percent in 2014. The incidence of discouraged workers increased from 1.0 percent in 2008 to 2.2 percent in 2013. Moreover, the share of temporary employment rose among the youngest cohort (15–24 years) from 59.2 percent in 2008 to 69.1 percent in 2014. Similar developments can be observed in Italy and Portugal.⁷

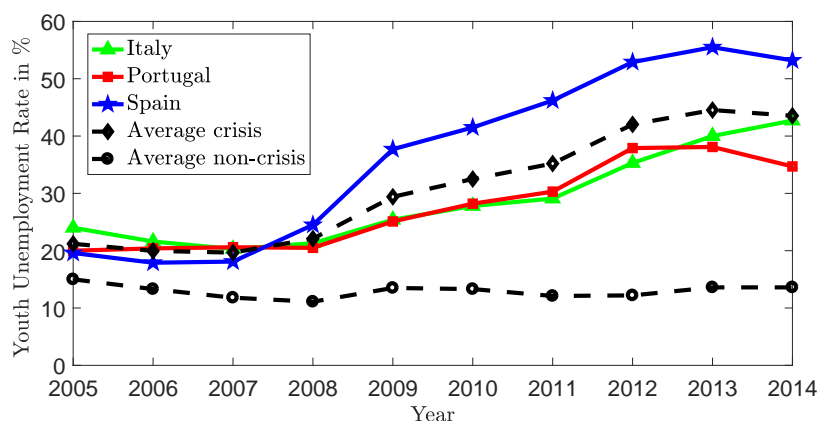
According to the crisis hypothesis, these dramatic figures should have triggered comprehensive policy changes. However, reform efforts have been rather limited. This lack of reform is reflected in the Heritage Foundation's Index of Labor Freedom for the crisis countries. The index is mainly based on World Bank data and measures labor market flexibility by considering various aspects of a country's legal and regulatory framework. It is measured on a scale between 0 and 100 where higher values indicate more flexibility (for a detailed description of the index see the Appendix). To measure the change of labor market regulation over the crisis years, we compare the index values for the pre-crisis year 2007 with the data for 2014 (see Table 4.1 on page 59). Contrary to the prediction of the crisis

6. Data are taken from Eurostat: <http://ec.europa.eu/eurostat>; accessed on 30 May 2015.

7. Data are taken from the OECD: <https://stats.oecd.org>; accessed on 5 November 2015.

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FIGURE 4.1: Youth unemployment in crisis countries 2005–2014



Note: The lines 'Average crisis' and 'Average non-crisis' depict average youth unemployment rates of the crisis countries and of selected non-crisis countries (Finland, Germany and the Netherlands), respectively.

Source: Eurostat.

hypothesis, values for Portugal have remained almost unaffected over this period while the index value for Italy has decreased, implying an even stronger regulation of labor markets. The Spanish index value has slightly increased during the crisis, but Spain's relative position within the comprehensive set of countries captured by the index has decreased from rank 115 in 2007 to 127 in 2014. Moreover, in a detailed evaluation of Spanish labor market policy during the crisis, Bentolila et al. (2012) argue that 'the extraordinary rise in unemployment in Spain since 2007 was insufficient to trigger labor market reform.' Overall, the sharp increase in youth unemployment in the crisis countries has not led to substantial labor market reforms.

Why have these extremely high rates of youth unemployment not induced more pressure to reform? Do these countries have a common characteristic which makes the crisis hypothesis fail? Interestingly, one cultural attribute shared by southern European countries is strong family ties. The important role of the family in these countries has long been highlighted in the sociological literature (see Reher, 1998). Alesina and Giuliano (2011) develop a quantitative measure of family ties based on data from the World Values Survey. The crisis countries are all characterized by strong family ties, especially compared to northern European countries (see Table

TABLE 4.1: Family ties and labor market freedom in selected euro area countries

	Family ties	Labor market freedom (in 2007 and 2014)
Crisis countries:		
Italy	0.2	75; 55
Portugal	0.0	43; 43
Spain	0.1	50; 53
Non-crisis countries:		
Finland	-0.6	46; 55
Germany	-0.7	46; 51
Netherlands	-0.8	66; 66

Note: Strength of family ties is measured on a scale from -1 (weak) to 1 (strong); labor market freedom is measured on a scale from 0 (strongly regulated) to 100 (mostly free).

Source: Alesina and Giuliano (2011) for family ties and Heritage Foundation (2015) for labor market freedom.

4.1 for an overview of the index values and Appendix C for a detailed description of the World Values Survey and the composition of the index).

Recent work suggests that family ties indeed have a significant impact on politico-economic outcomes, for instance on political participation and economic growth (Alesina and Giuliano, 2011, 2014). Moreover, and closely related to our work, Bentolila and Ichino (2008) show that financial transfers within families are more frequent in countries with strong family ties, especially when a household is hit by unemployment. Hence, the role of the family as a mechanism for insuring against unemployment appears to be particularly important in southern European countries. Moreover, higher indirect transfers are also a result of family ties. A survey by the 'European Foundation for the Improvement of Living and Working Conditions' (Eurofound, 2014) shows that, as a response to the poor employment situation, in 2011 more young people lived with their parents than did in 2007, with a more pronounced increase of co-residence in countries with strong family ties.

This evidence suggests that family ties and the resulting transfers might play a

role in determining support for reform. In the next section, we set up a simple political economy model that investigates how family ties affect public support for deregulatory labor market reforms in times of economic crisis. The model implies that in the presence of strong family ties the median voter might not be in favor of reforming a status quo characterized by strict labor market regulation and very high (youth) unemployment — as witnessed in the crisis countries in the years 2010 to 2014.

4.3 The model

The economy is populated by a unit measure of agents who differ in their state of employment: they are either insiders (i) or outsiders (o). Agents form families. A family is composed of two agents who are linked via altruism. Hence, an agent can be represented by a pair (j, \tilde{j}) where $j \in \{i, o\}$ refers to the agent's state of employment and $\tilde{j} \in \{i, o\}$ to that of the other family member. This yields three family types: insider families, outsider families, and mixed families. We denote the fraction of insiders in the population by η and assume that the employment states of two members of the same family are independent. We discuss this assumption in Appendix A.1.5.

4.3.1 Preferences

The preferences of agents are represented by the following utility function:

$$u(c_{j,\tilde{j}}) - 1_{\{j=i\}}d + \alpha \left(u(c_{\tilde{j},j}) - 1_{\{\tilde{j}=i\}}d \right),$$

where (j, \tilde{j}) represents the agent's type, $c_{j,\tilde{j}}$ his consumption and $c_{\tilde{j},j}$ denotes the other family member's consumption. Parameter α measures an agent's altruistic link to his or her family member, where $0 \leq \alpha \leq 1$. Moreover, $u(c_{j,\tilde{j}})$ is of the Constant Relative Risk Aversion (CRRA) type with risk-aversion parameter γ :

$$u(c_{j,\tilde{j}}) = (c_{j,\tilde{j}}^{1-\gamma}) / (1 - \gamma).$$

We assume that being an insider is associated with effort that causes disutility d . As we normalize the disutility of being an outsider to zero, the parameter d effectively reflects the difference in effort between insiders and outsiders.⁸ For the main part of our analysis we do not need to assume a lower bound on d .⁹ In contrast, note that we have to impose an upper bound \bar{d} on d to ensure that agents always prefer to be insiders rather than outsiders.

Each agent's budget constraint comprises the following elements. Insiders earn e_i , which is normalized to one: $e_i = 1$. Outsiders receive e_o satisfying $0 < e_o < e_i$. Besides income, agents can also finance consumption through wealth w . To simplify the analysis, we assume that there is no heterogeneity among agents with respect to wealth. Agents can transfer resources to their family member where $t_{j,\tilde{j}}$ represents the net transfer agent j receives from his or her family member. These three income sources are disposable to the agents, so the budget constraint of agent (j, \tilde{j}) reads

$$e_j + w + t_{j,\tilde{j}} = c_{j,\tilde{j}}.$$

4.3.2 Labor market and reform

The effects of deregulating labor market reforms have been extensively studied (see, among others, Blanchard and Giavazzi, 2003, Saint-Paul, 1993, 1995, 2004, Bentolila et al., 2012 and Aguirregabiria and Alonso-Borrego, 2014). A prime example of such a reform is a reduction of employment protection, for instance, a lowering of firing costs. Such a reform makes hirings more attractive for two reasons: First, via the direct channel of lowering the expected cost of future firings. Second, via the indirect effect of reducing workers' bargaining power and thereby putting downward pressure on wages. Thus, the reform tends to increase employment, yet at the cost of lower wages and/or greater risk of job loss for the established

8. To simplify the analysis, we assume a 'representative' outsider with constant e_o and $d = 0$. In reality, income and work effort are not constant among outsiders since these comprise a heterogeneous group of agents composed of the unemployed, the underemployed and workers in the low-wage sector. The working outsiders dispose of higher income than the unemployed but have less leisure and vice versa. Still, on average, insiders are likely to work more and enjoy less leisure than outsiders which speaks in favor of assuming $d > 0$.

9. Assuming $d < 0$ could be interpreted as an additional utility gap (beyond the wage gap) between insiders and outsiders arising from, for example, social stigma.

insiders. This nexus leads to a conflict between insiders and outsiders over reform: improved access to the labor market for outsiders comes at the price of reduced wages and/or lower job security for insiders.

To focus on the interaction of altruism and voting behavior, we do not model the labor market explicitly but rather take the above mentioned effects of labor market reform as given. We denote the share of insiders before voting on reform by the parameter η and the change in the insider share following reform by $\Delta\eta > 0$. The change of insider wages through reform is given by $\Delta e_i \leq 0$, where $e_o \leq e_i + \Delta e_i$ ensures that insider wages are never below outsider wages. Labor market flexibility is represented by the parameter f , with $0 \leq f \leq 1$, that captures the likelihood of job turnover in the absence of reform. At the extremes, agents either remain in their state of employment for sure in case of a completely rigid labor market ($f = 0$). Or, for $f = 1$, the probability of becoming an insider in the next period is independent of an agent's employment status ex ante. In general terms, the probability of remaining an insider if reform is not implemented is $p_i^n = 1 - f(1 - \eta)$. As a consequence, the probability for an outsider to become an insider in the absence of reform is now given by $p_o^n = f\eta$ — as the two probabilities have to satisfy $p_i^n\eta + p_o^n(1 - \eta) = \eta$. Here, and in the following, the probability of becoming an insider is denoted by p , where the subscript indicates the agent's employment status ex ante and the superscript denotes whether reform is implemented (r) or the status quo is preserved (n).

The change of labor market flexibility through reform is captured by the parameter Δf , where $0 \leq \Delta f \leq 1 - f$. If $\Delta f = 0$, reform has no impact on labor turnover. Conversely, $\Delta f = 1 - f$ implies that all agents have the same probability of becoming an insider ex post irrespective of their employment status ex ante. In general, if reform is implemented, the probability of remaining an insider is $p_i^r = 1 - (f + \Delta f)(1 - (\eta + \Delta\eta))$. The probability of an outsider to become an insider is given by $p_o^r = ((f + \Delta f)(1 - \eta - \Delta\eta)\eta + \Delta\eta)/(1 - \eta)$. Formally, the implementation of reform has the following effects. First, the labor market becomes more flexible ($\Delta f \geq 0$), insider wages decrease ($\Delta e_i \leq 0$) and the insider share in the economy increases ($\Delta\eta > 0$). The share of insiders after reform hence becomes $\eta + \Delta\eta$. The reduction of insider wages and a higher risk of job loss are the sources of the insiders' opposition to reform.

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TABLE 4.2: Overview of the model's parameters

Description	Parameter	Range	Section 4.4
Agent characteristics:			
Altruism	α	$[0, 1]$	0 and 1
Risk aversion	γ	$[0, \infty)$	0
Disutility of an insider job	d	$(-\infty, \bar{d})$	$(-\infty, \bar{d})$
Wealth	w	$(-e_o, \infty)$	$(-e_o, \infty)$
Labor market characteristics:			
Insider share ex ante	η	$[0, 1)$	$[0, 1)$
Insider income ex ante	e_i	1	1
Outsider income	e_o	$(0, 1)$	$(0, 1)$
Labor market flexibility ex ante	f	$[0, 1]$	0
Reform characteristics:			
Change of insider share	$\Delta\eta$	$(0, 1 - \eta]$	$(0, 1 - \eta]$
Change of insider income	Δe_i	$[e_o - e_i, 0]$	$(e_o + d - 1, 0)$
Change of labor market flexibility	Δf	$[0, 1 - f]$	0

Note: The last column provides the parameter values assumed in Section 4.4. More general cases are considered in Section 4.5 and Appendix A.1.

In the following, we only focus on the effect of a decreased insider wage ($\Delta e_i < 0$) and assume that job security remains unaffected ($\Delta f = 0$). In Appendix A.1 we consider several cases with $\Delta f > 0$ (some with $\Delta e_i < 0$ and others with $\Delta e_i = 0$). For all these parameterizations, we obtain the same qualitative results as in our baseline scenario where reform only reduces insider wages but does not decrease job security for insiders. Thus, focusing on only one of these effects simplifies the analysis without affecting the qualitative results of the analysis.

To focus on the role of family ties, we make a further strong assumption: We set $f = 0$, that is agents remain in their state of employment for sure in the absence of reform. In combination with $\Delta f = 0$, we obtain $f + \Delta f = 0$, which implies that all insiders keep their jobs for sure after reform ($p_i^r = 1$). The additional insider jobs generated by the reform are distributed among the former outsiders which implies

that the probability for an outsider to become an insider after reform is $p_o^r = \Delta\eta/(1 - \eta)$. In Appendix A.1-A.4, we show in a comprehensive sensitivity analysis that relaxing these strong assumptions made on the labor market characteristics does not change our results qualitatively. Table 4.2 summarizes all parameters of the model. We have to set the above mentioned upper bound $\bar{d} = u(e_i + \Delta e_i + w) - u(e_o + w)$ to ensure that, in the absence of altruism ($\alpha = 0$, and thus $t_{j,\tilde{j}} = 0$), agents always (also after reform) prefer to be insiders rather than outsiders, which requires $u(e_i + \Delta e_i + w) - d > u(e_o + w)$.

4.3.3 Voting on reform

Agents are in favor of reform whenever the expected utility of reform exceeds the utility in the absence of reform:

$$\begin{aligned} U_{(j,\tilde{j})}^r &= (1 - p_j^r)(1 - p_{\tilde{j}}^r)(1 + \alpha)u(c_{o,o}) + (1 - p_j^r)p_{\tilde{j}}^r(u(c_{o,i}) + \alpha(u(c_{i,o}) - d)) \\ &\quad + p_j^r(1 - p_{\tilde{j}}^r)(u(c_{i,o}) - d + \alpha u(c_{o,i})) + p_j^r p_{\tilde{j}}^r(1 + \alpha)(u(c_{i,i}) - d) \\ &\geq \\ U_{(j,\tilde{j})}^n &= u(c_{j,\tilde{j}}) - 1_{\{j=i\}}d + \alpha(u(c_{\tilde{j},j}) - 1_{\{\tilde{j}=i\}}d). \end{aligned}$$

where $U_{(j,\tilde{j})}^r$ represents the expected utility from reform and $U_{(j,\tilde{j})}^n$ denotes the utility in case of no reform for an agent who is of type (j, \tilde{j}) . Under the assumptions made above the respective probabilities become $p_i^r = 1$ and $p_o^r = \Delta\eta/(1 - \eta)$. The decision whether reform is implemented or rejected depends on the political process. We apply majority vote: reform is implemented if and only if

$$\sum_{j \in \{i,o\}} \sum_{\tilde{j} \in \{i,o\}} 1\{U_{(j,\tilde{j})}^r \geq U_{(j,\tilde{j})}^n\} \mu(j, \tilde{j}) \geq 0.5,$$

where $\mu(j, \tilde{j})$ represents the share of agents with characteristics (j, \tilde{j}) . The description of the voting scheme completes the model's politico-economic environment.

The median voter framework is the natural modeling choice in our setup, as we consider voting on a single reform with given characteristics. Faced with such a binary choice, even the multiple parties in a political system of proportional

representation — as in the southern European countries that motivate our analysis — would just split into two blocks: supporters and opponents to reform.

4.4 Family ties and economic reform

We now turn to the analysis of the model. In order to carve out the interaction between altruism, state of employment, and voting behavior as clearly as possible, we first consider risk neutral agents ($\gamma = 0$). Risk neutrality rules out any effects of wealth so we can set $w = 0$.

We begin the analysis by looking at the two extreme values of the altruism parameter: on the one hand, a complete absence of altruism ($\alpha = 0$), which we call the ‘individualistic case’, on the other hand the ‘completely altruistic case’ ($\alpha = 1$). Then, we explore voting behavior under ‘incomplete altruism’ ($0 < \alpha < 1$).

4.4.1 Individualistic case: $\alpha = 0$

First, note that the individualistic scenario of course implies that there are no transfers between family members, $t_{j,\bar{j}} = 0$. Agents are exclusively concerned with their own expected state of employment when it comes to the decision whether to vote in favor of or against reform. The outsider votes in favor of reform if and only if

$$U_o^r = p_o^r(u(e_i + \Delta e_i) - d) + (1 - p_o^r)u(e_o) \geq u(e_o) = U_o^n.$$

From the assumption that $d < \bar{d} = u(e_i + \Delta e_i) - u(e_o)$ it follows directly that $U_o^r > U_o^n$. Hence, an outsider always prefers reform. Conversely, as $\Delta e_i < 0$, an insider is always in favor of the status quo:

$$U_i^n = u(e_i) - d > u(e_i + \Delta e_i) - d = U_i^r.$$

Thus, all outsiders vote in favor of reform and all insiders vote against reform. Since we assume majority vote, the implementation of reform only depends on

whether the median voter is an insider or an outsider. This yields the following result.

Lemma 1. *Suppose $\alpha = 0$. Then reform is implemented if and only if there are more outsiders than insiders (i.e. iff $\eta < 0.5$).*

To interpret this result recall that the outsider share $1 - \eta$ is not the unemployment rate but also includes the underemployed, workers in the low-wage sector and employees with jobs characterized by low levels of protection. Hence, the outsider share can be much larger than the unemployment rate and can even exceed 50 percent in times of economic downturn (see Dolado et al., 2002 and Bentolila et al., 2012). The simple finding stated in Lemma 1 is in line with the rationale of the crisis hypothesis: reform will only be implemented if a sufficiently large share of the population suffers from the institutional rigidities of the labor market. We now turn to the question of how voting behavior changes in the presence of altruism. First, we analyze the case of complete altruism ($\alpha = 1$).

4.4.2 Completely altruistic case: $\alpha = 1$

In the case of complete altruism, the individual optimization problem becomes a ‘family problem’ since each agent weighs the well-being of both family members equally. Therefore, the altruistic family ‘speaks with one voice’ — that is to say, there is never disagreement and both members vote either in favor of or against reform. Importantly, this is also true when family members are in different states of employment — in contrast to the individualistic case in which members of the same family cast opposing votes on reform if their job status differs.

We first analyze the voting decision of families in which both members are in the same state of employment. Since members of these families are identical, their decision follows the same reasoning as that of their individualistic counterparts.

Lemma 2. *Families in which both members are outsiders (insiders) vote in favor of (against) reform.*

We can now derive the levels of the insider share η at which these families are median voters. Recall that the employment states of two members of the same

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family are assumed to be independent. Therefore, the share of insider families among all families is η^2 . Consequently, if $\eta^2 > 1/2$, i.e. $\eta > 1/\sqrt{2}$, the median voter is the insider family, and reform is blocked. Symmetrically, if $\eta < 1 - 1/\sqrt{2}$ the median voter is the outsider family and reform is implemented. These results imply that at the extremes of the employment spectrum the majority vote in the completely altruistic case is similar to the individualistic case.

The interesting interval is the one between these regions. In this interval the median voter is the mixed family which votes in favor of reform if and only if

$$(1 - p_o^r)[2u(\frac{e_i + \Delta e_i + e_o}{2}) - d] + p_o^r 2[u(e_i + \Delta e_i) - d] \geq 2u(\frac{e_i + e_o}{2}) - d. \quad (3)$$

In the risk neutral case, this simplifies to

$$p_o^r(e_i + \Delta e_i - e_o - d) \geq -\Delta e_i,$$

where the expression on the left-hand side of the equation represents the mixed family's expected gain from reform and the term on the right-hand side captures the loss due to lower wage of the insider family member. Since $p_o^r = \Delta\eta / (1 - \eta)$, this is equivalent to $\eta \geq 1 + (\Delta\eta / \Delta e_i)(e_i + \Delta e_i - e_o - d)$.

The voting decision of the mixed family hence depends on η . It votes in favor of reform only if the probability of becoming an insider for the outsider family member is sufficiently high. We denote the value of η that stipulates this probability reform threshold τ (recall that $p_o^r = \Delta\eta / (1 - \eta)$).

Lemma 3. *If $\alpha = 1$ and $\gamma = 0$, the mixed family votes in favor of reform if and only if $\eta \geq \tau = 1 + (\Delta\eta / \Delta e_i)(e_i + \Delta e_i - e_o - d)$.*

Hence, in contrast to the individualistic case, it is possible that the outsider member of the mixed family votes against reform. Only if $\eta \geq \tau$, the mixed family is willing to accept the wage loss in exchange for improved job perspectives for the outsider family member. Otherwise the mixed family prefers to maintain the status quo. From Lemma 2 and Lemma 3, Proposition 4 directly follows.

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Proposition 4. *If $\alpha = 1$ and $\gamma = 0$, reform is implemented if and only if $\eta \in [0, 1 - 1/\sqrt{2}] \cup [\tau, 1/\sqrt{2}]$, where $\tau = 1 + (\Delta\eta/\Delta e_i)(e_i + \Delta e_i - e_o - d)$.*

Thus, Proposition 4 entails that there is a non-monotone relation between η and the majority vote on reform if and only if $\tau \in (1 - 1/\sqrt{2}, 1/\sqrt{2})$, which implies the following Proposition.

Proposition 5. *If $\alpha = 1$ and $\gamma = 0$, there is a non-monotone relation between the insider share η and the majority vote on reform if and only if $\Delta\eta(e_i + \Delta e_i - e_o - d) \in (\Delta e_i \cdot (1 - 1/\sqrt{2}), \Delta e_i \cdot 1/\sqrt{2})$.*

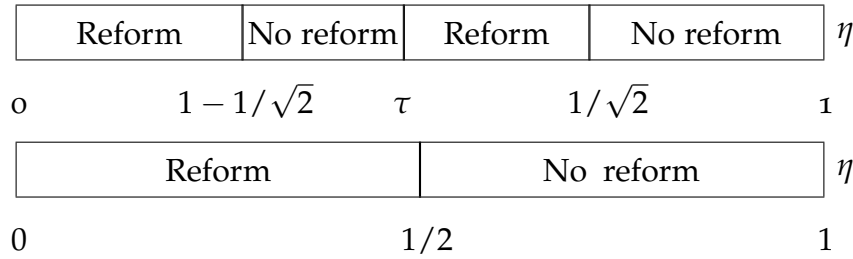
The term $\Delta\eta(e_i + \Delta e_i - e_o - d)$ is the aggregate gain of outsiders through reform, while the terms $\Delta e_i \cdot (1 - 1/\sqrt{2})$ and $\Delta e_i \cdot 1/\sqrt{2}$ are equal to the aggregate loss of insiders through reform at the bounds of the region where mixed families are the median voters. Thus, Proposition 5 implies that the non-monotonicity result holds if and only if the gain of outsiders through reform is bigger than the insiders' loss when there are very few insiders and smaller than the insiders' loss when there are many insiders. If this is not the case, non-monotonicity simply breaks down because the characteristics of the reform are either extremely positive or extremely negative implying that mixed families are always in favor of or against reform, respectively, no matter how large the share of insiders. A reform that satisfies the condition in Proposition 5 can nevertheless improve welfare substantially. For values of η close to $1 - 1/\sqrt{2}$ the gain for outsiders can be more than twice as large as the loss for insiders. Moreover, the welfare implications of reform would be even more positive if the effects on employers/capitalists were included. Figure 4.2 graphically compares the results of the individualistic and the completely altruistic cases.

The main conclusion is that altruistic links can have a significant impact on voting behavior. On the one hand, a relatively bad employment situation does not induce, but rather prevents reform (for $\eta \in [1 - 1/\sqrt{2}, \tau]$). On the other hand, a majority of the population is in favor of reform when the employment situation is relatively good (for $\eta \in [\tau, 1/\sqrt{2}]$).

When relating our model to the motivating example of the southern European crisis countries, the most interesting case is clearly $\eta \in [1 - 1/\sqrt{2}, \tau]$, when reform is blocked at low insider shares. If one takes into account that the group of outsiders,

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FIGURE 4.2: Reform decision as a function of the insider share η



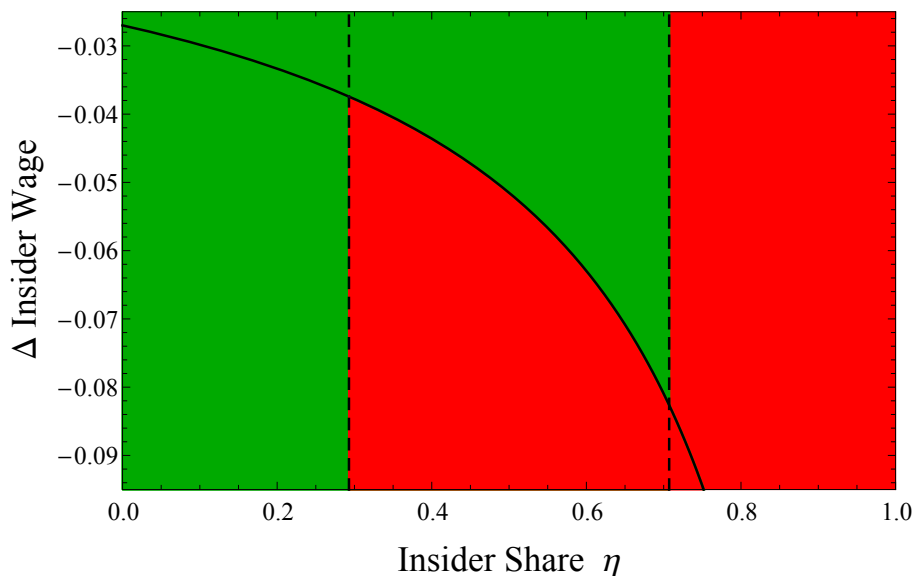
Comparison of the individualistic case (lower graph) and the completely altruistic case (upper graph).

besides the unemployed, also comprises temporary employed and underemployed workers, the insider share in these countries easily goes below τ -values of around 50 percent (see Bentolila et al., 2012). Moreover, as we show in the Appendix, the reform threshold τ can, depending on parameter values, be well above 0.5, which means that reform blockage (by altruistic mixed families) can occur at outsider shares far below 50 percent.

The reform threshold τ depends on various parameters. For illustration purposes, we now stipulate concrete values for the relevant parameters. We set $e_o = 1/3$, $d = 0.1$ and $\Delta\eta = 0.05$ and let the crucial parameter Δe_i vary.¹⁰ Figure 4.3 shows how τ , and thus the majority vote on reform, changes in reaction to the variation in Δe_i . In the red/dark regions reform is rejected, while it is accepted in the green/light regions. Dashed lines indicate a change in the family types that are the median voters: from left to right the median voters are first the outsider families

10. We assume in the baseline scenario that an outsider disposes of one third of insiders' income. As the group of outsiders is very heterogeneous, this parameter is difficult to match to the data. One reasonable proxy might be the ratio of minimum relative to average wages of full-time workers, which is very close to one third in Spain and Portugal (according to OECD: <https://stats.oecd.org>, accessed on 5 November 2015). Moreover, unemployment benefits are comparably low in the crisis countries and hence are unlikely to substantially increase the average outsider wage. The preference parameter d , which measures the disutility arising from the workload of an insider job, is also hard to pin down. We consider a value corresponding to 10 percent of the insider wage to be a sensible assumption. This might appear low at a first glance, however, it also reflects that insider jobs are associated with prestige whereas outsiders are often socially disadvantaged. Finally, the parameters $\Delta\eta$ and Δe_i depend on how comprehensive the reform is. In the baseline scenario, we set $\Delta\eta = 0.05$ and let Δe_i vary to analyze how this affects the support for reform by the mixed family.

FIGURE 4.3: Majority vote as a function of the change of insider wage and of the insider share



Note: Parameter values are $e_o = 1/3$, $d = 0.1$ and $\Delta\eta = 0.05$. Green/light regions indicate majority support for reform, while red/dark regions indicate rejection.

(0,0), then the (completely altruistic) mixed families, and finally insider families. The solid line is the mixed family's indifference curve. Figure 4.3 illustrates that the larger is the decrease of the insider wage following reform, the higher must be η to compensate the mixed family for the income reduction (i.e. the better must be the chance $\Delta\eta/(1-\eta)$ for the outsider to become an insider after reform). This is intuitive: As the reform becomes less attractive, the region where it is supported shrinks.

We have derived the above findings within a very stylized model to make the basic mechanism that reverses the crisis hypothesis as clear as possible. In the following, we show that our result still holds if some strong assumptions are relaxed. First, we consider the case of incomplete altruism ($0 < \alpha < 1$). Then, in Section 4.5, we show that in the presence of risk aversion and wealth the results also hold and can become even stronger. Appendix A.1 demonstrates that relaxing our assumptions made on the labor market and the considered reform does not qualitatively change our results. Higher f and $\Delta\eta$ decrease the reform threshold,

while a higher Δf increases the reform threshold. Finally, note that by assuming the benefit of reform to be an increase in insider jobs $\Delta\eta$ and the cost to be a reduction Δe_i in wages for η insiders, we stipulate that the net social benefit of reform $\Delta\eta(e_i + \Delta e_i - e_o - d) - \eta\Delta e_i$ is increasing in the outsider share $1 - \eta$. Thus, by assumption, there is an element in the model that works in favor of the crisis hypothesis. However, we have shown that the crisis hypothesis nevertheless breaks down due to the impact of family ties. In Appendix A.1.4 we show that this is still true if the net social benefit of reform is increasing even faster in the outsider share, in particular when reform creates more jobs in case the outsider share is high (i.e. when $\Delta\eta$ is a decreasing function of η).

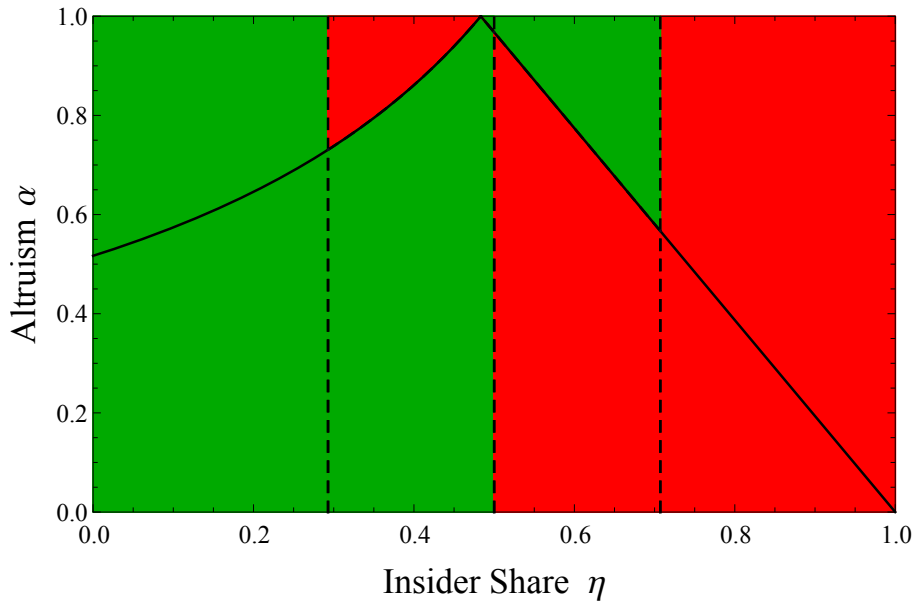
4.4.3 Incomplete altruism: $0 < \alpha < 1$

So far, we have looked only at the two extreme cases of the altruism parameter α . The median voter's choice strongly differs between the two cases. Naturally, the question arises how this choice changes when we move from one extreme to the other.¹¹ Appendix B derives the answer to this question analytically. Figure 4.4 graphically illustrates the results for the following parameter values: $e_o = 1/3$, $d = 0.1$, $\Delta e_i = -0.05$ and $\Delta\eta = 0.05$. Again, dashed lines indicate a change in the family types that are the median voters: from left to right the median voters are first the outsider families (o,o), then outsiders within mixed families (o,i), then insiders in such families (i,o), and finally insider families (i,i). Solid lines indicate the indifference lines of (o,i) and (i,o) members of mixed families. Going from the bottom to the top of Figure 4.4, we can see how the reform decision changes as the altruism parameter increases from zero to one. For low values of altruism, the decision is exactly as in the individualistic case. However, at a certain level of altruism ($\alpha \approx 0.55$) the insiders within mixed families start to favor reform even for η -values where they are the median voters ($\eta \leq 1/\sqrt{2}$). Similarly, there is a point ($\alpha \approx 0.73$) at which the outsiders of mixed families start to oppose reform

11. Another alternative to relax our assumption is to consider one-sided altruism only. Suppose insider parents are altruistic towards their outsider children, but not vice versa. In this situation the mechanism we describe is weakened as the children are not interested in their parents' consumption anymore, but still present, because children still receive transfers from their parents.

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FIGURE 4.4: Majority vote as a function of altruism and insider share for $\Delta\eta = 0.05$



Note: Green/light regions indicate majority support for reform, while red/dark regions indicate rejection.

even for η -values where they are the median voters ($\eta \geq 1 - 1/\sqrt{2}$). In this case the small chance for the outsider to obtain an insider job is not worth incurring the wage reduction for the insider family member. Both these regions become bigger as altruistic links become stronger, until the case of complete altruism is reached.

The upshot of this sensitivity analysis is as follows. First, moderately reducing the altruism parameter below one does not alter the qualitative findings: the crisis hypothesis still fails. Secondly, however, with low but positive levels of altruism, the majority vote does not differ at all from the individualistic case. Combined, these two findings suggest that two countries, even if they do not strongly differ with respect to the intensity of family ties, might qualitatively differ in their aptitude to embrace reform. For instance, in a country with altruism parameter 0.8 reform is blocked for a certain range of low insider shares, while in a country with altruism parameter 0.7 reform is implemented for all insider shares below fifty percent.

TABLE 4.3: Reform threshold as a function of the degree of risk aversion

Risk aversion γ	Reform threshold τ
0	48.3
1	55.2
2	61.0
3	65.9
4	69.9

Note: Parameter values are $e_o = 1/3$, $w = 0$, $d = 0.1$, $\Delta\eta = 0.05$ and $\Delta e_i = -0.05$. A higher reform threshold implies a larger region of η -values for which reform is blocked.

4.5 The role of wealth

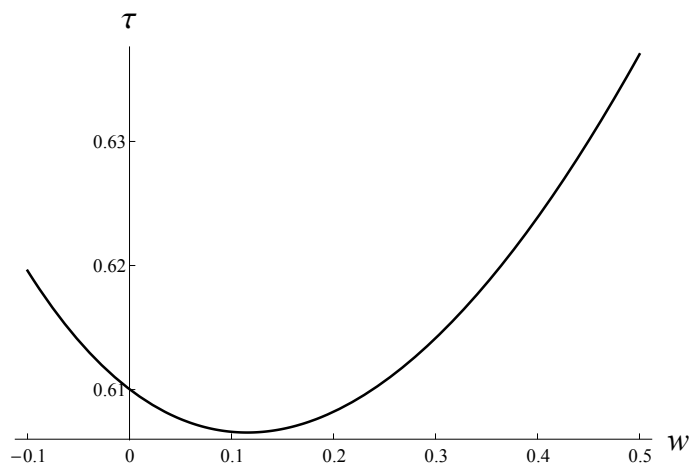
In this section we analyze how wealth as an additional source of intra-family transfers affects support for reform. This aspect is relevant for the crisis countries since these have a relatively high level of median net wealth. The ECB's Eurosystem Household Finance and Consumption Network (2013) reports median net household wealth in Italy, Portugal, and Spain of 173.5k €, 75.2k €, and 182.7k € respectively, compared to 85.8k €, 51.4k €, and 103.6k € respectively in Finland, Germany, and the Netherlands.¹² Therefore, we now allow for risk-averse agents ($\gamma > 0$) to study wealth effects. Additionally, we set $\alpha = 1$ to explore the relation between altruism and risk aversion as clearly as possible and to keep the analysis simple. How does risk aversion affect the voting decisions of agents within the pivotal mixed family? To answer this question, we have to consider Equation 3 on page 67, and solve for the reform threshold τ which represents the level of η at which the mixed family is indifferent between voting in favor of or against reform. If risk aversion is a small natural number, we can obtain an analytical solution for τ (see Appendix B). Table 4.3 summarizes how the reform threshold τ changes as a reaction to an increase in risk aversion.

Higher risk aversion leads to an increase of the threshold τ which implies a

12. Controlling for household size reduces the difference between southern and northern European countries, yet only marginally (see the ECB's Eurosystem Household Finance and Consumption Network, 2013).

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FIGURE 4.5: Reform threshold as a function of wealth w



Note: Parameter values are $\gamma = 2$, $e_o = 1/3$, $d = 0.1$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$.

reduced support for reform. The more risk averse agents are, the better must be the post-reform job perspectives to make the mixed family accept a reduction of the insider member's income. This result is intuitive as we would expect risk averse agents to oppose reform more strongly than risk neutral ones.

We now turn to the role of wealth. Under risk neutrality, wealth w has no effect. In the following, we show that this is not the case under risk aversion, which we set equal to $\gamma = 2$. The effect of wealth is ambiguous. On the one hand, wealth provides insurance against the worst case outcome of reform, namely that the outsider family member remains an outsider while the insider's wage is reduced. In this case, a wealthy family can still maintain a decent level of consumption. *Ceteris paribus*, this insurance effect decreases the reform threshold τ . On the other hand, wealth decreases the marginal utility of consumption and thus changes the trade-off between a higher income from an insider job and the associated higher disutility of work. While we only consider parameter choices where agents prefer to be insiders rather than outsiders, the utility margin by which they prefer to be insiders decreases with their wealth. This effect puts upward pressure on the reform threshold when wealth increases.

In Figure 4.5, we plot the overall effect of wealth on the reform threshold for $d = 0.1$, $e_o = 1/3$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$. The first effect initially shifts

the reform threshold of the mixed family slightly down indicating an increasing support for reform. Once the second effect dominates, the reform threshold is shifted up illustrating a reduced willingness of the mixed family to support reform.

In conclusion, we find that high levels of wealth can reinforce our core mechanism: if outsider members of a mixed family can increase their consumption not only due to transfers from the wage income of insider family members but also from dissaving family assets, then the parameter region in which reform is blocked becomes even bigger. In light of this theoretical finding one might conjecture that the high median household wealth in the crisis countries has contributed to the observed reform fatigue. However, the strength of this effect could only be properly assessed in a dynamic setup, in which the length of unemployment spells and the process of dissaving wealth are both explicitly modeled.

Throughout this section, we have assumed an equal distribution of wealth among agents. An interesting effect can occur when we allow for wealth inequality. First, suppose a situation in which all agents' wealth equals the value where the reform threshold reaches its minimum in Figure 4.5. Now consider a case with the same total wealth, but unequally distributed: there would be poorer families to the left and wealthier families to the right of the minimum. Both are less supportive of reform than without inequality. As a consequence, overall support for reform decreases.

4.6 Policy implications

In this section we discuss policy implications of our main results from Sections IV and V, respectively.

4.6.1 Austerity and reform

The main conclusion from Section 4.4 is that, in the presence of intra-family altruism, crisis might hinder rather than facilitate economic reform — a finding that casts doubt on the crisis hypothesis. This finding yields an interesting policy implication regarding the effect of austerity in countries with strong family ties. According to the crisis hypothesis, austerity measures that aggravate an economic

downturn could have a positive employment effect via the indirect channel of facilitating labor market reforms. Along these lines, Drazen and Grilli (1993, p. 598) argue that ‘crises may raise welfare if they are the only way to induce necessary policy changes.’ In contrast, our model shows that the consequences of austerity can be quite different when family ties are taken into account. In the presence of intra-family altruism an economic slump does not lead to employment-promoting reforms, but rather causes reform blockage and redistribution of resources from insider family members to outsider members. As can be seen in Figure 4.2 on page 69, a crisis reduces the willingness to reform in a range of the insider share where the individualistic case predicts reform. In contrast, stimulating the economy might encourage reform where the benchmark predicts blockage. Note, however, that this effect depends on the characteristics of the economy and the reform: Proposition 5 states that for reforms that are less attractive for the mixed family (namely, $\tau > 1/\sqrt{2}$), family ties simply expand the region where reform is rejected, but do not imply support for reform in case of relatively good economic circumstances. Our finding suggests that countries with different degrees of family ties might require diverging policy prescriptions to successfully induce economic reforms in times of crisis.

4.6.2 Wealth, inequality, and reform

The core result of Section 4.5 is that wealth matters for the mixed family’s voting decision on reform. As wealth increases, becoming an insider is less attractive since the utility gain of consuming the additional income is decreasing, while the utility loss of having less leisure remains the same. Hence, a high level of wealth can lead to reform fatigue, an aspect that might be relevant for the crisis countries where median net wealth is comparatively high (see, for instance, ECB, 2013).

Furthermore, we argue in Section 4.5 that resistance to reform might be even stronger if wealth is unequally distributed. On the one hand, poor mixed families oppose reform more strongly because they lack a wealth buffer that alleviates the worst case outcome of reform (a wage cut for the insider and no transition to insider status for the outsider). On the other hand, for the wealthy mixed families the perspective of both members becoming insiders is less attractive as

their marginal utility of additional income is relatively low. Therefore, in the presence of strong family ties, substantial wealth inequality can reinforce resistance to reform — redistributive policies, in contrast, have the potential to diminish reform blockage.

4.7 Conclusion

This chapter analyzes how family ties affect support for economic reform in times of crisis. We make a theoretical contribution to the literature on the political economy of reform by casting doubt on the crisis hypothesis, which states an inverse relation between the state of an economy and support for reform. Taking intra-family altruism into account can reduce support for reform in an economic crisis. Furthermore, our theoretical findings hint at a potentially important policy implication: austerity measures might block rather than foster economic reforms if applied to countries where family ties are strong. Our model provides an explanation for the limited reform progress in several southern European countries during and following the Great Recession.¹³ Of course, other mechanisms also play a role in creating opposition to labor market reform in the crisis countries. For instance, as older workers are both more likely to have a permanent contract and to be unionized, labor unions might oppose reform despite high youth unemployment (see Blanchflower, 2006, and Boeri and Jimeno, 2015). Another reason for reform blockage in the crisis countries might be that their political systems are mainly characterized by proportional representation, which requires cross-party compromises that might impede reform implementation (see, for instance, Persson and Tabellini, 2000).

Although we focus on labor market reform, the underlying mechanism of our model might also be relevant for other policy fields. For instance, the reform of a pay-as-you-go social security system that aims to ease the financial burden

13. Note, however, that some reform efforts have been made in the crisis countries, in particular in Spain in 2012 and Italy in 2014 (see OECD, 2013 and OECD, 2015, respectively). To the extent that labor market reforms have been implemented in the crisis countries, the mechanism described in our model suggests an explanation why these reforms have not been more comprehensive and why they have been significantly delayed despite massive pressure by the EU and the IMF (see, for instance, Bentolila et al., 2012).

on the young might be opposed by the latter if they receive transfers from their parents. Tabellini (2000) and Hansson and Stuart (1989) have considered a similar idea by arguing that intergenerational altruism leads to a willingness of the young to pay for the old. Our mechanism gives this story a new twist as the young prefer maintaining the system, in particular in times of crisis, because they expect transfers from the old. Another example is public sector reform. Many societies maintain inefficiently large and costly public sectors which is puzzling from a theoretical point of view (see the discussion in Acemoglu et al., 2011). According to our argument, it is especially difficult to reform such a public sector during an economic downturn if many voters are altruistically linked to state employees. Voters who would demand a reform that reduces an inflated public bureaucracy in the absence of altruism might oppose it if they can expect transfers from public sector employees.

In this chapter, we have chosen a static approach to present the mechanism relating family ties and reform support as clearly as possible. However, considering a dynamic setup would allow to address further important aspects like intergenerational conflicts, short-run versus long-run effects, and sustainability of reform.

This work is a first step toward understanding how family ties affect a country's tendency to reform. Further work — both theoretical and empirical — is needed to develop a more detailed understanding of this relation.

Appendix

A.1 Labor market and support for reform

Our baseline model in Section 4.4 is highly stylized for illustration purposes. In this Appendix we relax some of the assumptions previously made regarding the labor market setup, namely $f = 0$, and $\Delta f = 0$. We show that the model's results remain qualitatively unaffected when these values are changed.¹ To keep the analysis tractable, we continue to assume complete altruism and risk neutrality throughout this section. From the analysis in Sections 4.4 and 4.5, we know that the first assumption ($\alpha = 1$) strengthens the results while the second one ($\gamma = 0$) weakens them.

When we give up the assumptions made on f and Δf , the mixed family votes in favor of reform if and only if

$$\begin{aligned} & (1 - p_i^r)(1 - p_o^r)2u(e_o) + (p_i^r(1 - p_o^r) + (1 - p_i^r)p_o^r)(2u(\frac{e_i + \Delta e_i + e_o}{2}) - d) + \\ & \quad p_i^r p_o^r 2(u(e_i + \Delta e_i) - d) \\ & \geq \\ & (1 - p_i^n)(1 - p_o^n)2u(e_o) + (p_i^n(1 - p_o^n) + (1 - p_i^n)p_o^n)(2u(\frac{e_i + e_o}{2}) - d) + \\ & \quad p_i^n p_o^n 2(u(e_i) - d), \end{aligned}$$

where the probabilities p_i^r, p_o^r, p_i^n , and p_o^n are given in Section 4.3. In the following Subsections A.1.1 and A.1.2 we illustrate how our results change when we vary

1. Of course, our main result trivially breaks down when $\Delta e_i = 0$ and $\Delta f = 0$, as there is no disadvantage of reform in this case and therefore no reason for any voter to oppose reform. If, however, either Δe_i is substantially below zero or Δf is substantially above zero, then our main finding is robust to changes of these and the other parameters.

TABLE A.1: Reform threshold as a function of ex ante labor market flexibility

f	Δf	Reform threshold τ
0	0	48.3
10	0	47.9
20	0	47.1
30	0	45.4

Note: All numbers in percent. Parameter values are $e_o = 1/3$, $d = 0.1$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$. A higher reform threshold implies a larger region of η -values for which reform is blocked.

f and Δf separately (keeping the other parameter at its previous value) and also maintaining our assumptions on the remaining parameters: $\Delta e_i = -0.05$, $\Delta \eta = 0.05$, $e_o = 1/3$, and $d = 0.1$. In A.1.3 we consider scenarios in which we jointly vary all parameters of the model. In A.1.4 we relax the assumption that the impact of reform on Δe_i and $\Delta \eta$ does not depend on the insider share η . Finally, in A.1.5 we verbally discuss one further assumption of our model, namely that the job market states of two family members are independent of each other.

A.1.1 Labor market flexibility ex ante

The results in Section 4.4 are derived for $f = 0$ which means that all agents maintain their state of employment if reform is not implemented. Table A.1 illustrates how support for reform changes if we allow for labor market flexibility in the absence of reform. When raising f we keep the assumption that $\Delta f = 0$. The mixed family's objection to reform decreases slightly with increasing ex ante labor market flexibility. The intuition for this result is straightforward: the reason why agents vote against reform is to protect the high insider income. If this income is at risk anyway, even in the absence of reform, resistance against reform decreases as the potential gain associated with reform relatively outweighs the cost.

TABLE A.2: Reform threshold as a function of the change in labor market flexibility

f	Δf	Reform threshold τ
0	0	48.3
0	25	49.5
0	50	49.7
0	100	49.8

*Note:*All numbers in percent. Parameter values are $e_o = 1/3$, $d = 0.1$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$. A higher reform threshold implies a larger region of η -values for which reform is blocked.

A.1.2 Change in labor market flexibility

In Section 4.4, we assume that insiders keep their job for sure in case of reform (that is, $f + \Delta f = 0$). Table A.2 shows that relaxing this assumption (while keeping $f = 0$) does not change the qualitative implications of the model. However, the mixed family's support for reform is weaker the stronger is the impact of reform on labor market flexibility. The reason is that $\Delta f > 0$ introduces a second cost of reform: the insider might lose his job. While a higher Δf at the same time increases the outsider's chance to find a job, the impact on the job perspectives of the insider tends to dominate and the reform threshold therefore increases in Δf .

A.1.3 Sensitivity for various parameter combinations

Table A.3 on page 82 displays values of the reform threshold for different combinations of the parameters f , Δf , Δe_i and $\Delta \eta$, while we keep $e_o = 1/3$ and $d = 0.1$. The results show that the reversal of the crisis hypothesis holds for all these combinations: The region in which the mixed family rejects reform does not disappear, formally $\tau \in [1 - 1/\sqrt{2}, 1/\sqrt{2}]$, irrespective of the chosen parameter combinations. The influence of f and Δf on the reform threshold is as in the extreme cases considered in A.1.1 and A.1.2, respectively.

A higher $\Delta \eta$ pushes the reform threshold considerably to the left, thereby reducing opposition to reform. This is intuitive as a reform leading to more jobs

TABLE A.3: Reform threshold as a function of labor market characteristics

f	Δf	Δe_i	$\Delta \eta$	Reform threshold τ
25	25	-3	3	49.2
25	25	-3	5	42.1
25	25	-5	3	57.1
25	25	-5	5	49.4
25	50	-3	3	49.6
25	50	-3	5	45.7
25	50	-5	3	53.7
25	50	-5	5	49.7
50	25	-3	3	49.1
50	25	-3	5	40.9
50	25	-5	3	58.4
50	25	-5	5	49.3
50	50	-3	3	49.6
50	50	-3	5	45.3
50	50	-5	3	54.1
50	50	-5	5	49.6
0	100	0	5	45.0
0	100	0	3	47.0
0	100	-3	5	47.8
0	100	-3	3	49.8

Note: All numbers in percent. Parameter values are $e_o = 1/3$ and $d = 0.1$. A higher reform threshold implies a larger region of η -values for which reform is blocked.

is obviously more attractive for voters. The opposite is true for Δe_i as already discussed in Section 4.4.

We also consider the case where $f = 0$ and $\Delta f = 1$, i.e. there is no labor market mobility without reform and perfect mobility in case of reform. In this scenario our general result persists even if $\Delta e_i = 0$: The mixed family opposes reform (for low enough η) only because of the risk of losing the insider job.

Finally, we analyze the sensitivity of our results with respect to the outsider income and the disutility of the insider job. As Table A.4 on page 83 shows, the reform threshold is an increasing function of both variables. The reason is that an increase in any of the two variables makes the prospect to obtain an additional insider job through reform less attractive for the mixed family.

TABLE A.4: Reform threshold for varying outsider income and insider disutility

e_o	d	Reform threshold τ
25	0	30
25	10	40
25	20	50
33.3	0	38.3
33.3	10	48.3
33.3	20	58.3
40	0	45
40	10	55
40	20	65

Note: All numbers in percent. Parameter values are $\Delta f = 0$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$. A higher reform threshold implies a larger region of η -values for which reform is blocked.

A.1.4 Insider share and effects of reform

We assume in the baseline model that the impact of reform on Δe_i and $\Delta \eta$ does not depend on the insider share η . Importantly, this setup implies that the net social benefit of reform $\Delta \eta(e_i + \Delta e_i - e_o - d) - \eta \Delta e_i$ is decreasing in the insider share η , which works in favor of the crisis hypothesis and thus against our non-monotonicity result. In other words, the baseline model is sufficient to demonstrate that an increase in the insider share can have opposing implications for the welfare effect of reform and the political support for reform — the first being decreasing and the second increasing in η . However, it is certainly plausible that the impact of a labor market reform on insider wages and the number of insider jobs depends on η . If anything, Δe_i and $\Delta \eta$ should both be decreasing in η . While the first effect would work in the direction of our non-monotonicity result, the second would work in the opposite direction. We therefore now consider a modification of the baseline setup where only this second effect is present, namely $\Delta \eta = g(\eta)$ with $g'(\eta) < 0$. Following the derivation of Proposition 4, it is easy to show that for $\alpha = 1$, $\gamma = 0$, and $0 > g'(\eta) > \Delta e_i / (e_i + \Delta e_i - e_o - d)$, reform is implemented if and only if $\eta \in [0, 1 - 1/\sqrt{2}] \cup [\tau, 1/\sqrt{2}]$, where τ is the solution

to $\tau = 1 + (g(\tau)/\Delta e_i)(e_i + \Delta e_i - e_o - d)$. Thus, as long as $\Delta\eta$ does not decrease too fast in η (for our baseline $g'(\eta) > \approx -9.7$ percent) ensuring that p_o^r is still increasing in η , the qualitative results of the baseline model remain unaffected. Moreover, in a setup where both $\Delta\eta$ and Δe_i decrease in η , our non-monotonicity result can hold even if p_o^r is decreasing in η . Finally, note that in cases where the majority vote under altruism is monotone in η , the voting behavior can nevertheless differ substantially from the individualistic case. In particular, opposition to reform can still be much stronger in the altruistic case.

A.1.5 Correlation of employment states

Throughout this chapter, we assume that the employment states of members of the same family are uncorrelated. This assumption may seem oversimplifying, but we think that it is not essential for the analysis. On the one hand, consider the extreme of perfect positive correlation between the family members' employment states. In this case there would be no mixed families in the economy and altruism would obviously have no effect on voting. On the other hand, assuming perfect negative correlation implies that society is exclusively inhabited by mixed families who then trivially become the median voter for all values of η . Apparently, these two extremes seem to be irrelevant in reality. We think that in many societies, especially those in a crisis situation, the mixed family does indeed play an important role. In Spain, for instance, labor market dualism leads to a situation where many insider parents have outsider children (see Bentolila et al., 2012).

A.2 Mathematical details

A.2.1 Incomplete altruism

In this section, we derive the results regarding incomplete altruism that are illustrated in Figure 4.4 on page 72. The location of the dashed lines indicating changes in the median voter family types does not depend on altruism. The median voters are first (o,o), then (o,i), then (i,o), and finally (i,i). In contrast, it is non-trivial to derive the location of the solid lines that indicate the indifference lines of agents of

types (o,i) and (i,o) – that is to say, outsider and insider members of mixed families. Agents of type (o,i) vote in favor of reform if and only if

$$\begin{aligned} & (1 - p_o^r) \cdot (e_o + \alpha(e_i + \Delta e_i - d)) + p_o^r \cdot (1 + \alpha) \cdot (e_i + \Delta e_i - d) \\ & \geq e_o + \alpha \cdot (e_i - d), \end{aligned}$$

which simplifies (for the considered parameters $e_o = 1/3$, $d = 0.1$, $\Delta e_i = -0.05$ and $\Delta \eta = 0.05$) to $\eta \geq 1 - 31/(60 \cdot \alpha)$. Thus, the indifference line of insider members of mixed families, (o,i), is given by $\eta = 1 - 31/(60 \cdot \alpha)$.

Agents of type (i,o) vote in favor of reform if and only if

$$\begin{aligned} & (1 - p_o^r) \cdot (\alpha e_o + (e_i + \Delta e_i - d)) + p_o^r \cdot (1 + \alpha) \cdot (e_i + \Delta e_i - d) \\ & \geq \alpha e_o + e_i - d, \end{aligned}$$

which simplifies to $\eta \geq 1 - (31 \cdot \alpha)/60$. Thus, the indifference line of outsider members of mixed families, (o,i), is given by $\eta = 1 - (31 \cdot \alpha)/60$.

A.2.2 Risk aversion

We now derive the results regarding the reform threshold under risk aversion that are reported in Section 4.5. Observe that, for $\alpha = 1$, consumption is equalized across family members which simplifies the derivation considerably. The mixed family is indifferent between reform and no reform if and only if:

$$\begin{aligned} & (1 - p_o^r) \cdot \left(2u\left(\frac{e_o + e_i + \Delta e_i + 2w}{2}\right) - d \right) + p_o^r \cdot 2u(e_i + \Delta e_i + w - d) \\ & = \hspace{15em} \text{(A.1)} \\ & 2u\left(\frac{e_o + e_i + 2w}{2}\right) - d. \end{aligned}$$

Plugging in $p_o^r = \Delta \eta / (1 - \eta)$, as well as $e_o = 1/3$, $w = 0$, $d = 0.1$, $\Delta \eta = 0.05$, $\Delta e_i = -0.05$, and a value for γ , we can solve for η , which is the reform threshold. Table 4.3 on page 73 provides the results for several different risk-aversion parameters γ .

In Figure 4.5 on page 74 we plot the values of η that solve Equation A.1, when $\gamma = 2$ and wealth w varies. The solution is given by the following function of

wealth w :

$$\eta = (-41726 - 39629w - 16260w^2 - 7200w^3) / (-68400 - 72000w).$$

A.3 Data sources

A.3.1 Index of labor freedom

The description of the index is based on information provided on the Heritage Foundation's website: www.heritage.org/index/book/methodology. Following this link, a complete description of all ten index components of the Heritage Foundation's 'Index of Economic Freedom' can be found. Since our work only uses the sub-indicator 'Labor Freedom', we describe this component here.

The labor freedom sub-indicator is a quantitative measure that considers various aspects of the legal and regulatory framework of a country's labor market, including regulations concerning minimum wages, laws inhibiting layoffs, severance requirements, and measurable regulatory restraints on hiring and hours worked. Six quantitative factors are equally weighted: Ratio of minimum wage to the average value added per worker; hindrance to hiring additional workers; rigidity of hours; difficulty of firing redundant employees; legally mandated notice period; mandatory severance pay.

Based on data collected in connection with the World Bank's Doing Business report, these factors specifically examine labor regulations that affect the hiring and redundancy of workers and the rigidity of working hours. In constructing the labor freedom score, each of the six factors is converted to a scale of 0 to 100. A country's overall labor freedom score is then simply obtained by averaging the converted values of the six factors. Unless otherwise noted, the index relies on the following sources for data on labor freedom, in order of priority: World Bank, Doing Business; International Labor Organization, Statistics and Databases; World Bank, World Development Indicators; Economist Intelligence Unit, Country Commerce; U.S. Department of Commerce, Country Commercial Guide; and official government publications of each country.

Also note that, the index value of, for instance 2014, is based on data for the

period covering the second half of 2012 through the first half of 2013. Therefore, in Section 4.2, we report the index data lagged by one year to make them comparable to the youth unemployment data provided in Figure 4.1 on page 58.

A.3.2 Family ties

The description of the data sources is based on Alesina and Giuliano (2014), who provide the index values of family ties reported in Section 4.2. This index is based on data of the World Values Survey (WVS) (see www.worldvaluessurvey.org for a comprehensive description of the survey project).

The WVS is composed of national surveys on values and norms on a wide variety of topics, carried out four times (1981–1984, 1990–1993, 1995–1997, and 1999–2004). The questionnaires contain information on different types of attitudes, religion, and preferences, as well as information on demographic characteristics (gender, age, education, labor market status, income, etc.).

The strength of family ties is measured by looking at three variables from the WVS, which capture beliefs regarding the importance of the family in the respondent's life, the duties and responsibilities of parents and children, and love and respect for one's own parents. The first question assesses how important the family is in one person's life and can take values from 1 to 4 (with 1 being *very important* and 4 *not important at all*). The second question asks whether the respondent agrees with one of the two statements (taking the values of 1 and 2 respectively).

- Regardless of what the qualities and faults of one's parents are, one must always love and respect them.
- One does not have the duty to respect and love one's parents if they have not earned such respect and love.

The third question prompts respondents to agree with one of the following statements (again taking the values of 1 and 2 respectively).

- It is the parents' duty to do their best for their children even at the expense of their own well-being.

Appendix to Chapter 4

- Parents have a life of their own and should not be asked to sacrifice their own well-being for the sake of their children.

These measures are combined in two ways. First, the sum of all of them is taken and the variables are recoded such that a higher number corresponds to stronger family ties. Second, the first principal component is extracted from the whole data set with all individual responses for the original variables. This approach yields the index values of family ties we report in Section 4.2.

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Overview of separate papers and co-authorship

This dissertation includes a general introduction (Chapter 1) as well as three self-contained research papers (Chapters 2 to 4). Chapters 2 and 3 are single-authored. Chapter 4 is co-authored.

Chapter 2: Sovereign default risk in a federation

This chapter is single-authored and not published yet.

Chapter 3: Domestic redistribution through external default

This chapter is single-authored and not published yet.

Chapter 4: Reform support in times of crisis: The role of family ties

This chapter is co-authored with Johannes Brumm. It is published in *Economic Inquiry*:

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