CESifo DICE REPORT
Journal for Institutional Comparisons

CESifo

DICE Database: www.cesifo-group.org/DICE

CESifo DICE Report

Volume 12, Number 3 | Autumn 2014

PUBLIC-PRIVATE PARTNERSHIPS

RISK AND PUBLIC-PRIVATE PARTNERSHIPS

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Introduction[4]

The use of public-private partnerships (PPPs) to replace or supplement the public provision of infrastructure has become increasingly common. Public infrastructure projects that require large up-front investments, such as highways, light rails, bridges, seaports and airports, water and sewerage, hospitals, prisons and schools, are now often provided as PPPs.

A PPP bundles the investment in and service provision of infrastructure into a single, long-term contract. A group of private investors finances and manages the construction of the project, maintains and operates the facilities for a period of 20 to 30 years, and then transfers the assets to the government at the end of the contract. Depending on the project and type of infrastructure, the concessionaire's revenues are derived from user fees (as in the case of a toll road, for example), or from payments made by the government's procuring authority (as in the case of prisons).

Risk is a central theme in the PPP discussion and appropriate risk transfer to the private firm is essential for incentives. How should the different risks that emerge in any PPP be allocated between the government, the private firm and the users of the project? What is the cost of transferring risk to the private party? This paper offers answers to these questions.

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[4] This article is based on research reported in our forthcoming book (Engel, Fischer and Galetovic 2014a).

Risk, contracting and incentives in PPPs

The basic principle

The basic principle of risk allocation has been clearly stated by Irwin (2007, 14): the PPP contract should allocate risks to maximise project value, taking account of moral hazard, adverse selection and risk-bearing preferences. This is quite general, but it implies that controllable risks should be borne, at least in part, by the party best equipped to control them; for a party has weak incentives to be efficient when it does not bear a risk over which it has some control. Exogenous risk, on the other hand, should be shifted to the party that can bear or diversify it best. Under public provision taxpayers are liable for most of these risks with the exception, perhaps, of availability and service quality risk, which are borne by users.

Risks and contracting in construction and operation

Let us consider construction risk. Completion times and the cost of building often exceed projections, but these variables are usually controlled by the builder. Hence, the private firm should bear these risks (perhaps with the exception of delays caused by eminent domain disputes). Indeed, recent research by Blanc-Brude and Makovsek (2013) indicates that large construction companies bear these risks, but diversify construction risks across many projects and charge the risk premium to concessionaires. By contrast, under public provision construction risks are normally borne by contractors, but endemic renegotiations have the effect of shifting risks to taxpayers.

Similarly, design and diligence during construction have a strong impact on availability, operations and management (O&M) costs and service quality. Thus, these risks should also be borne by the private firm. If this process of risk transfer is effective, there should be large efficiency gains from PPPs, relative to public provision where these risks are mainly borne by taxpayers and users.

Bundling, control rights (the right to make decisions) and service standards are all required to ensure that

these risks are transferred efficiently to the private firm. For example, it is harder to make a firm accountable for service quality if it had no hand in designing and building the facility. Similarly, if the firm has no control rights over investment and operational decisions, it cannot be made accountable for maintenance and service quality. Finally, without objective and measurable service standards, it is difficult to transfer service quality risk from users of the facility to the firm.

As Hall (1998) points out, the extent to which risks are transferred depends largely on the choice of payment mechanism. Thus, to ensure strong incentives to complete the project on time, the firm should begin receiving payments only after the facility is operational. Similarly, payments contingent on the availability of the facility and on meeting service quality standards provide strong incentives for maintenance and management. In contrast, payments that are independent of performance or that transfer cost increases to taxpayers, lead to incentives similar to those under public provision.

Risks created by the government

Some of the risks in our list are controlled or created by the government. The residual value of PPP assets depends on government planning decisions and, as most project assets are specific, it is sensible to transfer that risk to the government. This occurs if the firm is able to recover its investment over the term of the contract. It also suggests that some policy risks should be borne by the government to avoid moral hazard.

Policy risks can be classified, broadly speaking, into two categories. Firstly, the government may implement policies that affect the project and little else. For example, it may build or expand a road that competes with a tolled PPP. It may even change the rules with the express purpose of expropriating the concessionaire. In general, these policy risks should be borne by the government to prevent opportunism and moral hazard.

Secondly, actions by the government may unintentionally affect PPPs. For example, a devaluation of the exchange rate may reduce the foreign firm's return, or a change in environmental standards may require additional investments. In these cases the government is not acting opportunistically and there is no good reason to have it bear the risk, as the private firm is in the same position as any other private firm in the economy. This principle is routinely overlooked. More generally, policy risks that have little to do with the project and

affect most firms in the economy (e.g. those caused by monetary policy) should not be a reason for preferential treatment for PPPs.

Exogenous risks

Perhaps the main exogenous risk in a PPP project is uncertainty about demand for the project over the life of the contract. Indeed, as the work of Flivbjerg, Bruzelius and Rothengatter (2003) shows, under public provision forecasts are notoriously imprecise and tend to overestimate demand.

The general principle, as mentioned before, is that exogenous demand risk should be borne by the party best able to bear or diversify it. It is worth noting, however, that if the private firm assumes demand risk, taxpayers are, in fact, purchasing an insurance contract. As Hall (1998) notes, this does not seem to be cost-effective. For example, future changes in policy, unknown at the time of tendering, may impact the demand for the facility. There is often little that an infrastructure concessionaire can do to reduce the impact on demand.[5] In these cases, either a present-value-of-revenue contract or availability payments are the appropriate compensation schemes (see below).

The principle of transferring exogenous demand risk to the government admits one clear exception, however. When the PPP is fully sustained by user fees, the willingness of private firms to bid for the contract signals that there is sufficient demand for the project. This market test is absent in publicly provided infrastructure services and helps to avoid white elephants.

One might think that, as in the case of demand risk, financial risk is largely beyond the control of the firm. Hence the government should also bear interest rate or exchange rate risk. This argument overlooks the fact that firms can choose across alternative capital structures and that, more generally, governments are not particularly efficient at providing and selling financial insurance.

Is there a PPP interest rate premium?[6]

A recurrent criticism of PPPs is that they cost more per dollar of financing than public debt – the so-called PPP

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[5] This applies to the case of highways, for example, where actions of the franchise holder have little effect on demand if contracted service levels are adequate and enforced.
[6] Based on Engel et al. (2014b).

premium. The numbers that have been quoted vary widely. According to Yescombe (2007, 18), the cost of capital for a PPP used to be 200–300 basis points higher than the cost of public funds. He also shows that the spread over the lender's cost of funds lies in the range of 75–150 basis points, with highway projects being at the upper limit (Yescombe 2007, 150).

Other authors, however, argue that there is no PPP premium. One line of argument claims that bondholder risk under public provision is subsumed under general government default risk. Thus, public debt is cheaper because the public implicitly absorbs the risk through potentially higher taxes or lower public expenditure in case of imminent default on all government debt. In other words, while many failed projects go unaccounted for under public provision because taxpayers assume the costs of this risk, under a PPP these risks are made explicit and priced, increasing the observed financing cost of a PPP project. This reflects the reward for carrying those risks, and is not a PPP premium.

Is the government better at diversifying exogenous, non-systematic risk?

Financial economists distinguish between systematic risk – that varies systematically with the market or the economy – and project-specific risk. Systematic risk cannot be diversified and should affect public and private financing in the same way. Is there a *prima facie* reason to think that the public sector is better at diversifying non-systematic risks than PPP financiers?

With perfect capital markets, the diversification that can be achieved by government participation in a large number of projects is also achievable through the capital market, so no PPP premium would exist. Hence, the PPP premium and the alleged financial advantage of public provision would seem to rest on capital market imperfections that give an edge to the diversification opportunities available to the government. Indeed, in the real world transaction costs preclude the existence of complete markets and limit diversification through the capital market. On the other hand, the increased diversification opportunities available to the government must be weighed against the administrative cost of its bureaucracy. Thus, it is not clear that the public sector has an edge over private firms and the capital market, again casting doubts over the existence of a PPP premium.

Are exogenous risks poorly allocated in PPP contracts?

A complementary explanation of the PPP premium is that the government has a superior capacity to bear risk. That could be the case in practice, but we will proceed to show that with appropriate contracting, the government can replicate the risk profile under public provision with a PPP, thereby eliminating the PPP premium.

To illustrate this, let us consider the following scenario: demand for the infrastructure is uncertain, so that the consumer surplus at time t, CS_t, and user fee revenues, R_t, are random variables determined by the state of demand, v, which represents one possible trajectory of demand realizations. The upfront investment, I, is the same in all demand states and operating and maintenance costs are zero. Finally, the PPP firm is selected in a competitive auction that dissipates rents.

Table 1 shows the distribution of the present value of cash flows and surpluses in demand state, v. Rows distinguish between funding sources (user fees and taxes). Columns distinguish between governance structures (public provision and PPPs). Within PPPs, alternative contractual forms are possible, depending on the source of revenues: PVR contracts (the concession term is flexible and lasts until a given revenue in present value is collected by the concessionaire)[7], fixed-term concessions, availability contracts (the concessionaire receives a regular payment provided that the infrastructure is available meeting service standards); and shadow tolls (the government pays the concessionaire a fixed fee per user).

It is worth noting that with user fee funding, public provision (column 1) and PVR (column 2) are identical. Similarly, public funding under public provision and availability payments are identical. This is our main claim: independent of the source of funds, PPP contracts exist that replicate in all demand states the surplus and cash flow distribution of public provision, and have the same impact on the intertemporal public budget.

To illustrate this, let X_a^b denote the present value of X_t between $t=a$ and $t=b$ at $t=0$ and consider first the case in which user fees fund the project. Under public provision, the project is built at cost I, and the firm receives I before the infrastructure becomes operational. Hence,

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[7] See Engel et al. (2001, 2013) for the conditions under which PVR contracts are optimal and Engel et al. (2014a) for an analysis of worldwide experience with flexible term PPP contracts.

Table 1

Risk allocation, source of revenues and contractual form			
Funding	Contractual form		
User fees	(1) Public provision	(2) PPP:PVR	(3) PPP: Fixed-term toll
Users	$CS_0^\infty(v) - R_0^\infty(v)$	$CS_0^\infty(v) - R_0^\infty(v)$	$CS_0^\infty(v) - R_0^\infty(v)$
Taxpayers	$R_0^\infty(v) - I$	$R_0^\infty(v) - I$	$R_0^\infty(v) - R_0^T(v)$
Firms	$I - I$	$I - I$	$R_0^T(v) - I$
Tax-subsidy	(1) Public provision	(2) PPP:Availability payment	(3) PPP: Fixed-term shadow toll
Users	$CS_0^\infty(v)$	$CS_0^\infty(v)$	$CS_0^\infty(v)$
Taxpayers	$-I$	$-I$	$-R_0^T(v)$
Firms	$I - I$	$I - I$	$R_0^T(v) - I$

Notation. v = state of demand; CS = consumer surplus; R = user fee or shadow toll revenue; I = upfront investment; X_s^t = present discounted value of X between times s and t, as of time 0; T = term of fixed-term contract.

Assumptions. The table depicts cash flows and social surplus in a given demand state v (corresponding to present discounted value of user fee revenue in the state). Rows distinguish between sources of funds (user fees and taxes); columns between procurement forms (public provision and PPPs). Demand for the infrastructure is uncertain (i.e. v is a random variable), so consumer surplus, CS, and user fee revenues, R, are random variables (as they are functions of the demand state, v). The upfront investment, I, is the same in all demand states, and operating and maintenance costs are zero. Firms are selected in competitive auctions that dissipate all rents.

Source: The authors.

taxpayers pay I upfront, collect $R_0^\infty(v)$ in state v and receive $R_0^\infty(v) - I$ in present value. Users, on the other hand, receive a net surplus equal to $CS_0^\infty(v) - R_0^\infty(v)$. Under a PVR contract, taxpayers save I upfront, but they relinquish user fee revenue during the length of the concession, which is equal to I in present value (because of competition for the PPP). Because the state collects user fees after the concession ends, taxpayers receive $R_0^\infty(v) - I$. Users' net surplus in state v is $CS_0^\infty(v) - R_0^\infty(v)$, as with public provision. This confirms that any risk bearing advantage for the government can be realized with a PPP under a PVR contract and no PPP premium should be observed.

Now let us consider the usual fixed-term PPP that lasts T years (column 3). The concessionaire collects $R_0^T(v)$ with surplus $R_0^T(v) - I$, which is a random variable; this contrasts with the case of a PVR contract where the concessionaire faces no risk. Taxpayers receive $R_T^\infty(v)$, and, in general, their risk falls.[8] A fixed-term contract thus

[8] This assumes that the standard deviation of R_T^∞ at time zero is decreasing in T, which is generally the case. It follows that with public provision or a PVR contract, the standard deviation of taxpayers' discounted revenue will be higher than under a fixed-term PPP.

shifts risk from taxpayers to the concessionaire because there is uncertainty about demand for the project during the fixed term T. Thus, part of the observed PPP premium may reflect faulty contract design, rather than a fundamental disadvantage of PPPs.

Let us move on to consider projects that are fully funded by taxes. Again, with public provision the project is built at cost I, which the firm receives before the infrastructure becomes operational – taxpayers pay I upfront. When a PPP is financed by availability payments, the timing of disbursements differs, but the present value of payments is still I. Hence, neither taxpayers nor the concessionaire bear risk, and the impact of the project on the intertemporal public budget is the same in both cases.

PPPs funded via taxes have sometimes resorted to shadow tolls. That is, the state pays a fee to the concessionaire for every user of the infrastructure for a fixed number of years, T. This type of PPP contract not only shifts risk to the concessionaire, but also creates risk. Since the concessionaire now bears risk, a PPP premium should be observed (lower right corner of Table 1). Viewed from this perspective, a shadow fee contract

consists of adding a lottery to an availability contract. The firm and taxpayers are forced to participate in a zero-sum lottery in which whatever is won by one party is lost by the other. Again, this leads to a risk premium that is not inherent to PPPs, but results from a specific contractual form. Of course, a lottery is a non-systematic risk *a fortiori*, and should be fully diversifiable through perfect capital markets. Nevertheless, it does not make sense to make the concessionaire play this lottery, because in the real world there are transaction costs.

Endogenous risks: is the PPP premium the cost of incentives?

There are many reasons why society may be better off under a PPP than under public provision. These motives generally impose additional risk on the private party. Firstly, investing in cost reductions and other efficiency-enhancing activities usually implies assuming risk, which usually increases the cost of capital for the concessionaire. This is the cost that must presumably be incurred to obtain a larger benefit. As Klein (1997) pointed out, the cost of funds cannot be considered independently of the incentive system under which intermediaries collect the funds.

A second argument in favor of PPPs is that projects are structured to provide incentives to internalize life-cycle costs during the construction phase. These incentives are not present under public provision (because of extensive renegotiations) and force the concessionaire to bear more risk.

More generally, one of the main points of a PPP is to shift endogenous risk to the concessionaire, to prevent moral hazard and strengthen incentives to cut costs and provide adequate service quality. Unless the concessionaire is risk neutral, society needs to pay to force him to accept the risk. Moreover, this risk is not diversifiable in the capital market, for if it could be diversified, there would be no incentive to improve performance in the first place. Hence, the 'right' PPP premium should compare financing costs under public provision coupled with an incentive contract where the agent bears endogenous risk, with the financing costs of a PPP. In practice, however, the inability of government to make remuneration depend on performance means that public provision cannot transfer endogenous risks to agents. Hence, there is no reason to believe *prima facie* that achieving equivalent incentives with public provision would be cheaper.

Conclusion

In this paper we have made two points. Firstly, in a PPP contract, policymakers choose which risks to transfer, and this affects efficiency and costs. On the one hand, there are compelling reasons to transfer construction and operation risks to the concessionaire. Concessionaires should also bear policy risks that have no direct relation to the project. On the other hand, demand risks should probably be borne by the government.

Secondly, with adequate contracting, PPPs can replicate the intertemporal risk profile of public provision. Hence, the so-called PPP premium may reflect faulty contractual arrangements, which inefficiently assign exogenous risks to the private partner. Alternatively, the PPP premium may pay the concessionaire for assuming endogenous risks that cannot be meaningfully separated from the incentive structure that is responsible for the efficiency gains under PPPs. For these reasons, the apparently higher cost of capital should not necessarily be interpreted as evidence against PPPs.

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Public-Private Partnerships and Efficiency: A Short Assessment

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Introduction

Over the last 35 years or so, governments around the world have enhanced the participation of private agents to deliver a wide variety of goods and services, traditionally delivered by the public sector. The development of public–private partnerships (PPPs) has been, and continues to be, one of the most popular contractual forms this increased private sector role has taken. Despite this long lasting interest, robust theoretical and empirical research on the efficiency of such partnerships has, however, only emerged relatively recently.

Theoretical frameworks designed to tackle "make or buy" issues and contracting strategies between private firms may have provided some of the clearest insights into issues related to contracting with governments. To many economists, PPPs may indeed be seen as a simple extension of vertical disintegration or contracting out by governments (de Bettignies and Ross 2009). But many also recognize that the political dimensions of PPPs call for further theoretical adaptations to give a fuller picture of the drivers of their efficiency (Spiller 2009; Williamson 1999). Despite the recent theoretical progress in identifying the necessary conditions for PPPs' efficiency, non-specialist analysts continue to focus on their ideological dimensions and interpretations. The rest of this brief assessment shows that the biases introduced by ideological discussions of PPPs are in sharp contrast to the more balanced theoretical and empirical research on the topic.

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What are we really talking about?

The notion of PPP is multifaceted and covers a wide diversity of contractual agreements characterized by different risk sharing and financing schemes, as well as different organizational forms. A broad definition of PPPs is that they are long-term contractual agreements between a private operator / company (or a consortium) and a public entity (both at the central or local level) under which a service is provided, generally with related investments. More precisely, PPPs can be defined as global contracts (bundling both investments and service provision) with delayed payments. For instance, in the case of concession contracts, these payments are financed through user fees and/or subsidies. In the case of PFI (private finance initiative) contracts, they are financed through public payments, which serve as reimbursements.[3]

The world enjoys fairly longstanding experience with these contracts. Concession contracts or their equivalents have existed for several hundred years. PFI contracts, by contrast, are relatively new. They were launched in the early 1990s in the UK and have enjoyed regular improvements, often to upgrade their efficiency payoffs. Figure 1 gives a sense of their importance in Europe, where the leader in their use continues to be the UK. In the past, they financed 12 to 30 billion euros of European public investments annually, reaching a peak just before the beginning of the recent crisis.

Promises and threats of PPPs

The lower degree of political interference (Boycko, Shleifer and Vishny 1996), risk transfers and the more up-to-date technical and management knowledge of private agents dealing with a global contract bundling investment and service provision (Hart, 2003) are widely viewed as the three main drivers of improvements in efficiency that PPPs can contribute to the delivery of public services. But research also shows that reality is a lot more subtle and the efficiency outcome of PPPs should be expected to be less predictable than often assumed.

[3] Hybrids may exist with payments depending on both user fees and public payments.

Figure 1

**European PPP market 2004–2013
by value and number of projects**

Source: EPEC Market Update 2013.
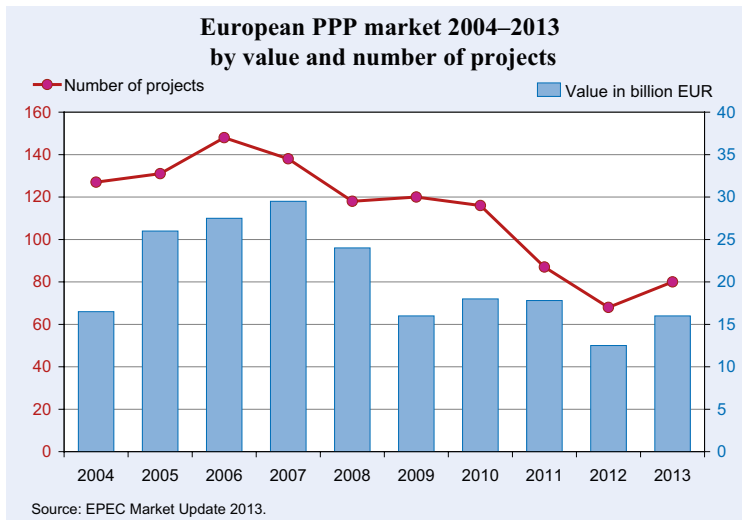
The unpredictability mainly stems from the incomplete nature of PPP contracts resulting from the fact that they do not specify what the contracting parties should do in every future situation. This generates transaction costs – i.e. difficulties in implementing and enforcing these contracts (Williamson 1985) and hence threats to PPPs.

Theoretical research justifies the cases made to push public authorities to improve their ability to: (i) identify projects to be financed through PPPs (i.e. projects creating social value); (ii) specify the characteristics of the service they commission; (iii) deal properly with the award stage; (iv) work through the contractual details, and (v) invest in the enforcement of the contract. (See the other papers of this journal issue for more details about what theory suggests at every step of PPP implementation). Any government mistake on any of these fronts is a threat to the efficiency promises of a PPP. How important these threats are is ultimately an empirical matter and this evidence is also complex, as discussed below.

Empirical evidence: what do we know?

Empirical evidence confirms that PPPs can indeed lead to improvements in efficiency, but do not necessarily do so. The econometric evaluation of various types of PPP experiences indeed shows that the careful choice of control variables, the proper framing of the PPPs' institutional and sectoral context and the careful avoidance of selection biases in sample choices matter to the conclusions reached by empirical tests of the impact of PPPs

on efficiency. Recognizing the relevance of these factors allows the identification of the circumstances under which PPPs are likely to enhance efficiency, and those under which they will not. This section briefly reviews the empirical lessons on the circumstances that may limit the efficiency payoffs of PPPs for a wide range of infrastructure public services.

The risks of optimism biases in project selection

Failures to improve efficiency with a PPP start with the extent to which a project meets a need. Ideally, a careful demand study needs to reveal the willingness to pay for the project and in cases where externalities are relevant, the state has to make sure that they can be dealt with not only equitably for users and taxpayers, but also efficiently from a technological viewpoint. This identification is not as simple as it sounds and strategic overestimations of demand are common practice (Trujillo, Quinet and Estache 2002, Flyvbjerg 2014). Such manipulation can be carried out at the initiative of the public or the private sector. It turns out that who actually identifies the need and initiates the case for a project is not an important driver of the large number of cases of optimism bias observed around the world. White elephants can benefit both politicians and private providers. They do not seem to be reduced by PPPs.

Let us consider the case of Spain. The recent experience of PPPs in Spanish transports reveals how a systematic large-scale ex-ante overestimation of demand can lead to an oversized or misallocated transport network (e.g. Bel, Estache and Fourcart 2014). The optimism bias in transport riding on a country growth strategy anchored in the construction industry has been costly. Spain has ended up closing a large number of recently built regional airports and train stations due to a lack of demand. Many of its toll roads, also built under PPPs, are just as financially unsustainable.

A basic sense of the relevance of cost functions allowed a fair number of economists to raise concerns about the quality of project sizing for a much larger number of countries and many of these papers pointed to the cost

inefficiency in ports (Gonzàlez et al. 2009), airports (Oum, Yan and Yu 2008) or roads (Bel et al. 2014). This is not to say that all PPPs have failed. To the contrary, many have indeed been quite effective. But it serves to show that project selection biases happen, probably too often, and that the suppliers of PPPs may not have an incentive to raise red flags early on. This problem is even more central in PFI-like contracts for which private firms' revenues are not conditioned to future demand. If value for money reports are generally mandatory, they are susceptible to manipulations (House of Commons 2011).

As suggested by Bel et al. (2014) in the Spanish case, the mis-targeting of demand can be consistent with either incompetence or collusion between public and private actors. Either way, efficiency is not the outcome of the initial need identification phase, whether a private partner is present or not.

The failures of the procurement process

The second driver of the efficiency of PPPs for which empirical evidence is quite robust is the quality of the procurement process. In countries in which public procurement is poorly organized or corrupt, PPPs offer an opportunity to reform procurement processes to cut costs by increasing competition for a project or a market. They represent a way of circumventing the inertia of procurement practices inherited from times in which governments were trusted to deliver public services in the interest of consumers.

Although significant improvements have been achieved in recent years, the challenge remains both in developed and in developing countries. A recent survey conducted by PwC and Ecorys (2013) on behalf of the EU shows that corrupt procurement processes continue to be a significant issue, particularly in infrastructure. In a sample of eight EU countries, the survey finds that the highest probabilities of corruption are the staff development services (23–28 percent) and the construction of wastewater plants (22–27 percent). The probability of corruption is lower for rail (15–19 percent), for road (11–14 percent), and airport runway construction works (urban & utility construction) (11–13 percent). The overall direct costs of corruption in public procurement in 2010 ranged from EUR 1.5 billion to EUR 2.3 billion, with about 19 percent of the estimated value of tenders for public expenditure on works, goods and services published in the EU electronic tendering system in the eight EU member states covered by the survey.

Although corruption is a serious problem, it should not hide the fact that the design of procurement itself often seriously limits the extent to which governments can make the most of the opportunities offered by PPPs. For a large sample of developing countries benefiting from World Bank and Japanese aid, Estache and Iimi (2011) show how public sector procurement rules often tend to limit or distort competition in public markets to deliver infrastructure needs, such as roads or water and sanitation facilities. The inefficiency associated with the limitations of the process represents at least eight percent of the infrastructure needs of the developing world—and much more in countries in which corruption and incompetence combine to allow inflated costs.

The upshot is that PPPs help, but they are not a sufficient condition to ensure improvements in efficiency as compared to pure public provision. The recent European Concession Directive voted in February 2014 highlights that these problems are also present in PPPs to a large extent (Directive 2014/23/UE). Indeed, the Commission justified the need for a new European Directive because many concession contracts where directly awarded, without any prior notification or call for tenders (Saussier 2012).

Theory suggests that designing procurement procedures when the risks of corruption or collusion are serious demands a willingness to adopt somewhat counter-intuitive processes to optimize efficiency prospects, including granting some discretionary power to public authorities. For instance, Bajari et al. 2009, using a data set of contracts awarded in the building construction industry in Northern California from 1995–2001 by private authorities, found that more complex projects – for which ex ante design is hard to complete and ex post adaptations are expected – are more likely to be negotiated, while simpler projects are awarded through competitive bidding. Furthermore, buyers rely on past performance and reputation (Spagnolo 2012) to select a contractor when deciding to award the contract through direct negotiations. This suggests that it is recommendable to leave open the possibility of negotiating to a certain extent, especially for PPPs that are complex and may not rely automatically on weighted criteria to define the best economic offer.

The extent to which a PPP "skims the cream" off a sector

The third driver of the impact of PPP on efficiency identified in the empirical literature requires some refocusing of the discussion. Most of the empirical literature

Table 1

Selected studies on the frequency of renegotiations in PPPs			
Geographical area	Sector	% of renegotiated contracts	References
Latin and Caribbean America	All sectors	68%	(Guasch 2004)
	Electricity	41%	
	Transport	78%	
	Water	92%	
United States	Highways	40%	(Engel, Fischer and Galetovic 2011)
France	Highways	50%	(Athias and Saussier 2007)
	Car Parks	73%	Beuve et al. (2013)
United Kingdom	All sectors	55%	NAO (2001)

Source: The authors.

tends to look at the extent to which PPPs can influence efficiency in the context of a specific project. From a sector perspective, however, this does not necessarily guarantee efficiency. If cream skimming takes place, economies of scale or scope can result in higher aggregate costs for the sector, i.e. the aggregate performance of a highly effective PPP and of a poorly efficient residual sector can lead to a lower aggregate efficiency level (Estache and Wren-Lewis 2009). This concern helps to explain the differences in the degree of unbundling in sectors observed from the mid-1990s to the mid-2000s and ever since.

When Cameroun decided to concession its electricity company, it opted not to unbundle the vertically integrated public company. Part of the argument was that it reduced the perception of risks by the investors. But it was also because there was a risk that the fiscal costs of the non-competitive segments of the client basis would be excessive since serving them would have to rely on higher cost techniques. Similar observations can be made concerning the packaging of water concessions in Argentina for instance, or in discussions on the regionalization of ports and railway services in both developed and developing countries.

The challenges of matching the contractual choice with the institutional context

The fourth efficiency driver is the institutional context in which the PPP takes place. This institutional context has several dimensions, including the approach adopted to supervise and/or regulate the sector and the specific nature of the PPP contract (i.e. concession, construc-

tions, maintenance, management etc.). PPPs tend to embed the basic regulatory framework that will guide their evolution, which relates to basic features such as prices, quality, penalties, termination etc.. Very often, the regulatory framework is embedded within the formal contract and there is no regulator. However, empirical evidence suggests that contracts are not always a good tool for regulating PPPs, especially when the project is complex and the contract very incomplete.

The fact that PPPs are long-term contracts means that they need to be adapted over time. This gives rise to frequent renegotiations (see Table 1). Those renegotiations can be viewed as evidence of opportunistic behaviours from contracting parties. As stated by Guasch, Laffont and Straub 2008 "High rates of contract renegotiation have raised serious questions about the viability of the concession model … in developing countries" (p.421). Others suggest that such renegotiations are "renegotiations without any hold-up" highlighting corruption and political issues at stake in some countries concerned by PPPs (Engel, Fisher and Galetovic 2006). However, because renegotiations are sometimes useful, in a sense, it is possible to say that the frequency of contract renegotiation may provide concessions 'relational' quality (Spiller 2009; Beuve 2013). Whatever the reason why PPPs are renegotiated, one central message is that renegotiations are the rule, not the exception and this has an impact on efficiency. The institutional framework in which PPPs are evolving are not neutral to explain their efficiency.

There is an abundance of econometric evidence demonstrating that effective regulators can allow PPPs to improve total factor productivity and labour productivity, even if this evidence varies across sectors and across regions. Although it has been quite positive for the telecoms sector and positive in many cases for transport (largely because competition works well in these two sectors), the story is a lot more complex for electricity and water and sanitation (Erdogdu 2011, 2013). For electricity, public-private investments in generation and large-scale investments such as distribution and transmission concessions has generally lead to significant improvements in efficiency. In water and sanitation, the

evidence of increased efficiency due to private sector participation (e.g. von Hirschhausen et al. 2009 for a recent survey) is less clear, even if empirical evidence in France shows that the prices charged by PPPs are not higher than those levied in cases of direct public management for French big cities without any national regulator (Chong, Saussier and Silverman 2014). Moreover, the evidence is neither particularly clear for airports (Oum et al. 2006) nor for ports (González and Trujillo 2009, Vasigh and Howard 2012).

Sustainability

The final dimension deals with the sustainability of any efficiency gain achieved by a PPP. Both economists and political scientists have been very effective in recent years in increasing our collective awareness of the various dimensions of governance, from weak institutions surrounding PPP to the overwhelming politics of PPP. Berg et al. (2012) point out in their study of telecoms that it affects more private firms than government-owned firms. For transports, Galilea and Medda (2010) suggest that corruption is not just about procurement. Governance and democratic accountability also matter to the impact of a PPP on the sustainability of the sectoral efficiency gains they may have delivered. Galilea and Medda (2010) find a positive association between a low accountability level and a PPP's success for all transport sectors except toll roads. Less accountable governments "seem more willing to fulfil the long-term requirements" or are perhaps easier to make accountable when the PPP process increases the transparency of transactions in the sector.

Conclusion

One of the more general conclusions to be derived from this short theoretical and empirical overview of research on PPPs' efficiency is that they deal with specific hazards that are not present for private contracts, and that understanding the drivers of these hazards is essential to understanding the extent to which PPPs will help or hurt efficiency. Spiller (2009) wisely argues that: "the perceived inefficiency of public or governmental contracting is simply the result of contractual adaptation to different inherent hazards, and as such is not directly remediable". Those different hazards linked to institutional context are now well-identified and increasingly well documented. They are, however, still waiting for a general theory (Estache and Wren-Lewis 2009) to guide and structure empirical research. This is particularly important as politicians continue to make efficiency commitments on behalf of PPPs that do not really determine ways to improve PPPs' efficiency. In this context, the evidence also shows that regulators and competition agencies have a stronger role to play than they are credited for by policymakers betting on PPPs. And so do regulation, liability rules, and authorized contractual provisions, even if their optimal design is likely to differ from one country to another due to differences in institutional constraints and history.

More theoretical developments and empirical investigations should obviously be developed to understand how economic agents tentatively deal with the various hazards identified with PPPs, and whether this could be enhanced by innovation in contractual and/or institutional design. This should be a top-priority on the research agenda, especially since the problems that plague PPPs are increasingly recognized and are also present in traditional procurement contracts in a business that represents on average 13 percent of the OECD GDP (OECD 2013). In other words, getting PPPs wrong is unlikely to be cheap.

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Corruption in Public-Private Partnerships, Incentives and Contract Incompleteness

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Introduction

When a contractor operates a highway on behalf of a government, who should bear traffic risk, the contractor or the government? When new sector legislation changes the required standards, who should pay the adaptation costs on ongoing projects? When a contractor operates a staff canteen on behalf of a university, should it be allowed to increase coffee prices if the price of coffee granules increases? And should all the possible contingencies that may materialize during the contract life be regulated by the contract?

These questions typically arise for complex procurement projects such as Public-Private Partnerships (PPPs), which are concession contracts whereby the supplier (typically a consortium of firms) takes responsibility for building and managing a public infrastructure for a number of years. PPPs are widely used across Europe, Canada, the US and a number of developing countries in sectors such as transport, energy, water, IT, prisons, waste management, schools, hospitals and others; and are attracting growing attention from policymakers because of their potential to use private finance in infrastructure development.

Somewhat surprisingly, the contracts used in practice provide different answers to the questions above. For example, in PPPs for highways, the World Bank recommends that traffic risk be borne entirely by the contractor, whilst in the Indian's standardized contract for highways, traffic risk is borne by the contractor unless the fall in traffic is caused by a change in macroeconomic

conditions. Furthermore, contracts show different degrees of completeness, i.e. different degrees of comprehensiveness in the number of contingencies regulated by the contract. In the UK, for example, risk allocation is typically summarized in an extensive *risk matrix* appended to the contract, which spells out each specific risk that may arise under the contract and how such risks will be shared between the contractor and the public authority (HM Treasury 2007). In Italy, by contrast, risk matrixes are rarely used and risk allocation is often left vague.

The problem with using contingent clauses to regulate the parties' relationship when specific circumstances arise is that contingent clauses require the anticipation, description and verification of the events that subsequently occur. A traffic-risk clause, such as the one mentioned above, will require, for example, that the parties specify how to define, measure and verify the change in macroeconomic conditions that may trigger the application of revenue compensation to the contractor. More generally, anticipating, describing and verifying contingent clauses involves contracting costs that may vary with project characteristics, such as complexity or value, with the efficiency of a country's institutions, and with the maturity of the PPP market. Verifying materialized contingencies can also be difficult both in terms of the technologies and the degree of expertise required. For example, in the case of highways, it may be impossible to perfectly ascertain whether a traffic reduction is caused by poorer macroeconomic conditions or by higher fuel prices.

In Iossa and Martimort (2014), we investigate the benefits and costs of writing complete, and more flexible, contracts in a risky environment. We consider a principal agent model with a three-tier relationship between a public authority (principal), a public official (supervisor) and a firm (the agent), in a public procurement context where project revenues are affected by the contractor's operating effort and by exogenous shocks. Contingencies (such as a change in macroeconomic conditions) may occur at the contract execution stage that exogenously affect revenues from operations (for example, because highway traffic falls).

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Regulating those contingencies in specific contractual clauses involves contracting costs that are the private knowledge of the public official. Incentives to the contractor are provided through a payment structure that allocates revenue risk between the contractor and the public authority. Contingent clauses may provide for the contractor to receive monetary compensation when shocks occur. Contingent clauses are triggered by self-reports made by the contractor. In PPP practice, self-monitoring is often used, with the contractor verifying the contingencies that have materialized and his own degree of compliance with the contractual obligations whilst the contract manager, hired by the public authority, supervises the process.

We show that when the state is verifiable, namely when contingencies can be objectively verified at no cost, optimal risk-sharing calls for contingent clauses to fully compensate the contractor for revenue shocks outside his control. In terms of our motorways example, this suggests the desirability of the Indian contractual approach, where changes in macroeconomic conditions trigger compensation for the contractor. This is because full insurance on exogenous and verifiable events reduces the risk premium that is due to the contractor for undertaking the project, without weakening operational effort incentives. As these shocks (macroeconomic conditions in the example) are beyond the control of the contractor, effort incentives are unaffected, all other things being equal. In fact, the better insurance that a more complete contract provides may result in stronger incentives to make an operational effort, as it becomes overall optimal to agree that the contractor will bear a greater *share* of traffic revenue. In economists' jargon: "complete contracts are higher powered."

In cases where, by contrast, the state is not verifiable, as it is the case when the contractor has private information on the realized contingency, contract manipulations may occur and this has an impact on the optimal design of the PPP contract. The contractor may misreport his information, always claiming that a negative macroeconomic shock reduced the traffic demand and thus its revenues, in order to obtain compensation from the public authority. To prevent such misreporting, offering full compensation to the contractor for the (presumably) lost revenues becomes suboptimal. This, in turn, implies that more demand risk is transferred to the contractor under the PPP contract, and that a higher risk premium will have to be paid to induce the firm's participation.

However, the precise degree of demand risk transfer may change across countries and projects. Our analysis suggests that different types of contracts are optimal depending on the level of contracting costs: more complete contracting providing for state contingent clauses should be chosen only when contracting costs are sufficiently low relative to the benefit from lower risk premia and better incentives. When contracting costs are high, using contingent clauses to regulate risk allocation becomes too costly, making rigid, incomplete contracts preferable to flexible, complete ones.

This, in turn, suggests that leaving discretion in contract choice to public officials can be beneficial in order to optimize the trade-off between risk premia and contracting costs: the public official in charge of contracting with the contractor should have the discretion to use his information on contracting costs in order to decide on the level of contract completeness. But this opens up a new problem, as discretion can be abused by rogue public officials to secure personal favors or bribes.

Our comparative statics exercises show that we should expect more complete contracting when uncertainty is greater, as this factor increases the benefit of insuring the private contractor against exogenous shocks. More complete flexible contracts should be used when institutions are stronger, or when the PPP market is more mature, as contracting costs are lower in such cases. Countries where public institutions are weaker and there is high incidence of corruption and poor accountability in the public sector, or countries with little experience in PPP agreements, should opt for more rigid incomplete contracts. The cost – in terms of contractual distortions – of corruption is therefore greater when the value of complete contracting is highest, as it is the case for projects with high uncertainty, greater risk aversion of the contractor and weak institutions.

Conclusions

Our paper emphasizes how incomplete contracting may favor corruption (and vice versa) because of higher risk premia, and that incomplete contracting can be strategically favored by non-benevolent authorities. Whilst the insights of our paper do not confine themselves to PPP practices, they capture institutional issues for these complex projects very well.

Corruption practices in public procurement can take place at different stages of the procurement process:

namely in planning, tendering, contracting, or execution. Corruption at the contracting stage is possibly the most subtle and the most difficult form of corruption to detect, as once a bad contract has been designed, undue benefit for the contractor is difficult to challenge. PPP agreements are particularly vulnerable to corruption because of their complexity and the central role of the design stage. Contracts are typically kept confidential, and little transparency exists on the contingencies that trigger monetary compensations to the contractor, or even on the amounts paid (Hemming 2006). The incidence of corruption has also been recorded (Engel, Fisher and Galetovic 2011).

It is well known that renegotiation of contract terms opens the door to contractual agreements that favor private interests and that are out of public sight because they occur at the post-tender stage. There is indeed ample evidence that corruption can explain the widespread use of post-contractual renegotiations in Latin American concessions (Guasch 2004; Guasch and Straub 2009). Corruption is not the only channel by which non-benevolent policy-makers may influence renegotiation. Engel et al. (2009) discuss evidence from Chilean renegotiations of PPP contracts, and argue that governments had incentives to renegotiate PPP contracts and elude spending limits to favor their re-election.

Our analysis is somewhat complementary to that line of research, since we show that corruption may also have a role to play at the ex-ante stage when parties decide how detailed their agreements should be. Weak institutions which are more prone to corruption may also be associated with incomplete deals. Because those incomplete deals are also those most likely to be renegotiated, the impact of corruption on contract design and economic performances is likely to be even more significant than suggested by the earlier literature that focused only on its ex post role.

Furthermore, the planning and design stages of most PPP contracts involve two different layers of the governmental hierarchy: the central government (for example, the national Department of Transport) and the local government (a local authority). The former typically coordinates the national PPP program and provides guidelines for contracts and tenders; the latter implements and monitors local projects. Such delegation of contracting may help to ensure that the contract reflects relevant local information (such as contracting costs), but it also exposes the central government to the risk of corruption at the local level. Some countries, such as the UK, have

made recourse to standardized contracts designed centrally and imposed locally with minor variations, thus reducing the degree of local discretion. Considering the Indian standardized contract mentioned above, our paper suggests that taking away macroeconomic risk from the contractor is indeed optimal; but, as such contingency may be difficult to verify in practice, an institution such as the World Bank may have to give up such contingent clauses in financing and supervising PPP projects in weak institutions. The incompleteness of the standardized World Bank contract is therefore also in line with our predictions. Fighting corruption involves decreasing the discretion of contracting authorities by making greater use of centrally determined guidelines on contracts, or even standardized contracts designed centrally and applied locally, like those used in the UK or by the World Bank. Finally, it has been observed that when institutions are stronger (in the sense that bureaucrats are more accountable), contract completeness is greater (Jakobsen, Sande and Haugland 2010), as predicted by our results.

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Self-interest Springs Eternal: Political Economy Reasons why Public-Private Partnerships Do Not Work as Well as Expected

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Introduction

In many countries public-private partnerships (PPPs) deliver a wide range of goods and services, including roads, bridges, water treatment plants, schools, hospitals and prisons. In a "classical" PPP, a government typically uses a consortium of private sector firms to finance, design, construct, operate and maintain some new physical public infrastructure. Despite the increasing use of PPPs, evidence shows that many PPPs have produced unsatisfactory outcomes, including high transaction costs and project bankruptcy.[3] We argue that many of these problems ultimately stem from the conflicting goals and motivations of governmental actors and their private sector "partners". Furthermore, although society must delegate operational authority to governments, governments are not society. Governments (being a mix of politicians and bureaucrats) can act in their own interest, often in ways that are antithetical to the interests of society as a whole. Additionally, private sector firms have their own self-interests, which are rarely congruent with the interests of society.

In order to explain why PPPs can fail to deliver social value, it is necessary to briefly explain what that means, that is, to provide a benchmark for comparison purposes. The most appropriate normative criterion for evaluating the social value of PPPs is *social welfare* (Boardman and

Vining 2011). In contrast, most of the criteria that governments and proponents of PPPs explicitly or implicitly use to justify the use of PPPs – such as deferring expenditures ("we don't have any money to do this"), placing expenditures "off-budget", better "value for money" and more "on time and on budget" – are inadequate or irrelevant. Indeed, using these criteria to deliver public infrastructure can lead to the destruction of social welfare, rather than its enhancement.

The political economy analysis of PPPs

Broadly speaking, our theory of PPP behaviour and performance can be described as a political economy (PE) theory because it focuses on the consequences of individuals, firms and institutions (governments) engaging in primarily self-interested behaviour. (PE theory is also known as public choice theory or rational choice theory.) According to Buchanan (1996, p. 12) "(PE) analysis attempts to relate the behaviour of individual actors in their various capacities as voters, as candidates for office, as elected representatives, as leaders or members of political parties, as bureaucrats…to the composite of outcomes that we observe or might observe."

PPP projects are government projects, even though private-sector agents deliver and manage them. From a principal-agent perspective, a government is the principal and the private sector participants are agents. To understand the behaviour of PPPs it is essential to consider the goals of both "partners". In addition, where there are user fees, it is useful to consider the goals of project users.

First, let us consider governments. Oversimplifying somewhat, we posit that in their use of PPPs, governments essentially seek to maximise votes (Downs 1957) or political benefits. Governments routinely seek to obscure their level of spending and the tax requirements associated with that spending (Borcherding, Ferris and Garzoni 2004). If the political costs of direct taxation and expenditures increase because of debt and deficits, governments will move to more opaque methods of raising revenue or expenditures (Sauer 2001). They do so because elected officials act as though they believe that

voters do not exhibit rational expectations with respect to expenditures (Marlow and Joulfaian 1989; Joulfaian and Marlow 1991). Ura and Socker (2011) summarise this fiscal illusion argument as follows: "…factors that attenuate the link between taxes and government spending (such as deficit financing or tax complexity) distort perceptions of the costs and benefits of government services and can lead to inefficient resource allocations." In sum, incumbent governments wish to provide current users and (myopic) voters with the benefits of infrastructure projects, while deferring their costs to future politicians, future voters and users. Given that a current (democratic) government faces some positive probability that it will not be in power in the future, it usually exhibits a high political discount rate, that is, it attaches a low weight to future costs. All other things being equal, it prefers to defer budget recognition of current expenditures to future governments and to defer taxes to future taxpayers. Where governments face public sector borrowing limitations, their goal is to keep borrowing off their balance sheets until future time periods (see Burret and Feld 2014 for the evidence).

A fundamental difference between a PSC (Public Sector Comparator) and a PPP concerns the timing of cash flows. In a PSC, government incurs large "up front" costs and relatively low costs "over time" (typically for 30 years); whereas in a PPP, government pays nothing "up front" and a lot more "over time".

Governments can therefore garner political credit for delivering project benefits instantly, while transferring many of the government costs to the future. However, the government cash costs are merely shifted, not eliminated. Boardman and Vining (2010b) characterise this government strategy as "renting the money". Can "renting the money" increase social welfare? Probably not. The government's payments are transfers from a social perspective. Even if the PPP's operating costs were lower, the PPP would require compensation for arranging the financing and assuming risks, and government transaction costs would probably be higher, as discussed later.

Another dimension of vote maximisation concerns governments' calculations of political risk associated with unsuccessful infrastructure projects. When governments engage in major infrastructure projects, project risk often "morphs" into political risk. Very large cost overruns or drastically overestimated revenue projections are hard to hide and can be exploited by the media and opposition parties. From a normative perspective,

different project risks should be allocated to the party that can mitigate them at the lowest cost. From the PE perspective, however, there are benefits to governments from attempting to reduce the political risk that can arise from project risk, even when such attempts do not reduce costs. In effect, a PPP can buffer governments from both the negative financial consequences of projects and the political risks that the latter entail.

Finally, PPPs may provide political benefits to politicians by channelling financial benefits to aligned interest groups like merchant banks, investment banks, large construction companies and consultants.

The primary goal of private-sector participants (firms) is to maximise profits. Sometimes this reality gets lost in the "partnership" rhetoric and in governments' desire to deliver services. More precisely, firms wish to maximise the present value of their future risk-adjusted cash flows *at all times* during the contract. There are two components: cash flows and risk. As far as cash flows are concerned, the initial private-sector participants obviously want to maximise the present value of their cash flows over the entire life cycle of the contract, and will develop an initial profit-maximising strategy. Over time, as events unfold, especially unforeseen events, firms' optimal strategies will often change (Dagdeviran 2011). For example, some members of a consortium may find it profit-maximising to sell their equity interest almost immediately. Other firms may be quite aware that PPP contracts operate within a milieu where governments seek to maximise votes and could exploit this situation opportunistically. They may pander to governments' desire for lower expenditures in the short run, expecting that they will be able to extract more profits later through renegotiation of incomplete contracts (Dagdeviran 2011).

In terms of risk, private sector participants will forego some expected profits if they can reduce risk sufficiently. Indeed, firms often turn out to be more risk-averse than public-sector participants had expected. One potential reason is that firm managers and investors typically bear the consequences of taking investment risks that turn out badly more directly and personally. Whatever the reason, firms often require high premiums to accept risk or may not be prepared to accept certain kinds of risk at all. Of course, they will be unable to obtain a high risk premium if the bidding process is highly competitive, but often it is not, due to numerous barriers to entry stemming from the nature of the project, its size and complexity, steps taken by the government itself (for ex-

ample, restricting bids to domestic firms), expertise in contracting with government or other barriers.

Finally, we consider (potential) project users who have to pay tolls or user fees. Again simplifying somewhat, users will lobby for free access (that is, a zero price) to project services, even when the social marginal cost is positive (non-zero). It is difficult, although not impossible, for future users to get organised (there may be a collective action problem) *before* the project payment regime is finalised. Thus, users tend to have little influence over whether a project is developed as a PPP or as traditional government procurement. However, users can and do mobilise after the infrastructure has been built and tolls are imminent or in place.

Taxpayers, by contrast, have paid almost no attention to PPP issues, whether because of the well-known collective action problem (Olsen 1965; Sandler 1998) or because of fiscal illusion (Dollery and Worthington 1996). In practice, therefore, they can be largely ignored from the PE perspective.

Political economy analysis and the social welfare consequences of PPPs

Governments' tendency to maximise votes, firms' tendency to maximise profits, and paying users' tendency to want free infrastructure services, along with taxpayers' tendency to be rationally ignorant and myopic, lead to some predictably negative consequences. Of course, our criticisms of PPPs should not be seen as an endorsement of traditional government procurement, which also has many problems (Flyvbjerg 2014). This section examines the behaviour and outcomes of PPPs based on our analysis of numerous peer-reviewed studies (Boardman and Vining 2012). We contrast these behaviours and outcomes with the objective of social welfare maximisation and attempt to provide explanations for them from a PE perspective. Overall, studies on this topic to date have adopted a wide variety of empirical and critical perspectives. Some simply documented obviously bad outcomes such as strategic behaviour, bankruptcy, eventual government take-over or disputes over cost overruns. A few studies adopted an explicit social welfare evaluation perspective.

Much of the evidence about PPP performance comes from value for money (VfM) studies. Many of these studies claim that PPPs have lower total costs (in present value terms) than a notional alternative called the public sector comparator (PSC) that is representative of traditional public-sector provision. However, such conclusions should be greeted with scepticism. Many scholars have questioned the accuracy, depth and objectivity of VfM studies (Heald 2003; Shaoul 2005; Edwards et al. 2004; Shaffer 2006; Boardman and Vining 2010a; Johnston 2010). As an indicator of social welfare, VfM studies have many potential problems. First, they only consider the cost to government and ignore impacts on consumers, producers or employees. They therefore omit important segments of society.[4] Second, transaction costs are omitted or are likely to be under-estimated for reasons we discuss later. Third, VfM studies have often been conducted by the same government agency that is responsible for deciding whether to engage in a PPP in the first place (Vining and Boardman 2008b). These agencies may be biased. Fourth, it is very difficult to obtain independent corroborating evidence as the relevant data resides in the government agencies that are responsible for promoting PPPs. Fifth, most VfM studies use inappropriate discount rates (Johnston 2010). Moore et al. (2004) and Boardman, Moore and Vining (2010) argue that the appropriate real discount rate to use in a social welfare evaluation of any government project is in the region of 3.5 percent, while some VfM studies use real discount rates in the region of seven percent and others use discount rates of about one percent. In some extremely biased VfM studies, PPP's costs are discounted at the PPP consortium's weighted average cost of capital, while the PSC's costs are discounted at the government's borrowing rate, which is much lower.

In fact, some *ex post* evaluations find that PPPs do not have lower costs in any meaningful sense. Edwards et al. (2004), for example, concluded that the UK Highways Agency paid a 25 percent premium on the construction cost of its first four PPP road projects in order to ensure that they were built "on time and to budget". Similarly, Blanc-Brude, Goldsmith, and Valila (2009), in their examination of European road project PPPs carried out between 1990 and 2005 conclude that *ex ante* construction prices of PPPs were approximately 24 percent higher than for traditional road procurement. They find that this is roughly equivalent to reported *ex post* cost overruns for traditionally procured roads.

We now turn to risk transfer by governments. Governments usually transfer *most* of the design, construction and operating cost risk to the PPP. PPP proponents often maintain that this transfer is a major benefit

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[4]   For example, the comparisons are not always "like with like", that is, there may be quality differences between the PPP and the PSC.

of PPPs. However, from a social welfare perspective, "a transfer is a transfer". There are risks associated with any project. If welfare weights are equal to one (usually the appropriate assumption), and a given risk is simply transferred from the government to the private sector, any reduction in government risk is completely offset by an increase in risk held by private-sector equity and/or debt holders. The change in social welfare is zero.

What matters from a social welfare perspective is whether a PPP will reduce the cost of the negative outcomes. PPPs might potentially be better able to reduce some risks than traditional public-sector provision due to superior managerial competence or superior cost-containment incentives and behaviours. Nonetheless, private sector participants are compensated for bearing these risks. Risk transfer should not be double counted or treated as an additional benefit, but it often is. Furthermore, governments always remain as the *residual* financiers and risk holders. Whenever a private-sector consortium goes bankrupt, governments often feel compelled to move forward with the project (Dagdeviran 2011). Given that governments should ignore "sunk costs", completion of most projects is appropriate. In practice, however, some private-sector investors also receive a significant reduction in their "haircut". In effect, the private sector has a put option (although one without a strike price), which is probably under-priced in most PPP contracts.

The evidence suggests that PPP consortia are usually unwilling to accept revenue risk, which depends on demand (sometimes called use risk) and pricing (tolls). Vining and Boardman (2008a) found that PPP projects with the highest use risk were less likely to have this risk transferred to the private sector. These PPP projects were "greenfield" projects. Not surprisingly, the private sector is more willing to accept use risk and revenue risk in "brownfield" (concessionary) projects where there is a user track record, e.g., US road concessions where traffic volumes (at least at current toll levels) are easily verifiable.[5]

Vining and Boardman (2008a) also observed that use risk was typically higher in larger projects, indicating that the private sector may be especially unwilling to take on use risk when projects are large. Governments with little experience of PPP negotiations seem particularly unable to transfer *any* revenue risk and often end up essentially guaranteeing private-sector profits; see, for example, the Zagreb Wastewater Treatment Plant in Croatia, and the Horgos-Pozega Highway in Serbia (Bacheva-McGrath et al. 2008).

For the reasons discussed above, private sector participants may try to renegotiate contracts when they observe, or can create, an opportunity to do so (Posner, Ryu, and Tkachenko 2009; Dagdeviran 2011). Such actions increase governments' transaction costs. VfM studies do include some estimated transaction costs, but the accuracy of these estimates is highly questionable. Many PPP projects are likely to have high transaction costs because they often have many of the following characteristics: high asset specificity, high complexity, high uncertainty, high construction or use risk (or both), low *ex ante* competitiveness and poor government contract management skills (Vining, Boardman and Poschmann 2005). PPP infrastructure projects always have unique characteristics. They are often fairly complex and may suffer from considerable uncertainty, given that they are usually long-lived and life cycle use can be influenced by many exogenous factors. Of course, complex and uncertain projects are exactly where governments would like to reduce their risk exposure, but they tend to have high transaction costs. While government contract skills in some countries are improving, they are often still poor. In these cases, governments are particularly vulnerable to opportunistic behaviour by private sector participants. Bacheva-McGrath et al. (2008) document many PPP projects in Eastern and Central Europe that have exhibited high transaction costs, including the M1/M15 motorway in Hungary, the Trakia Highway in Bulgaria and the Horgos-Pozega motorway in Serbia. In sum, PPP contracting can be thought of as government contracting out under unfavourable circumstances. Vining and Boardman (2008a) argue that transaction costs have been high in the past even in developed countries. It is probable that when accurate estimates of government transaction costs are added to government production costs, the potential cost superiority of PPPs is considerably diminished or eradicated in some jurisdictions.

PPP advocates often treat the sale proceeds from concessions as a benefit without appropriately considering the opportunity cost. Brown (2007 p. 322), for example, claims: "One of the key drivers of value in the Indiana Toll Road, Chicago Skyway, and Texas SH 121 leases was the ability of the concessionaire to make an upfront payment in return for the future cash flows that the pro-

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[5] It is debatable whether the sale of existing facilities should even be considered as PPP "infrastructure" projects: they are essentially financial engineering projects; see Ashton, Doussard, and Webber (2012) and Snyder and Luby (2012). Such projects are unlikely to increase social welfare as we discuss later.

ject would produce." Concession sales are similar to "renting the money" because government cash flow is higher upfront and lower in the future than would otherwise occur. As discussed earlier, this strategy cannot be explained by social welfare maximisation. But, it can be explained from a PE perspective. The obvious benefit is that governments get money *now*, which they can use to obtain political benefits like reducing current taxes or engaging in other voter-desired projects.

An additional attractive feature of concession sales from governments' perspective is that users might be willing to pay higher tolls to the PPP than to a government-managed project, although evidence is hard to find. Nonetheless, greater distance from toll payers may reduce a government's political risk when tolling and allow PPPs to impose or increase user fees.[6] The PPP may act as the "bad cop" and then share the higher toll revenues with government. This strategy presumes a certain naivety on the part of user-voters or an inability to overcome the collective good problem. It does not always work. Users can be an effective lobby group and, on occasion, they have forced governments to "buy out" the PPP operator.

How well do private-sector participants in PPPs fare? As one might expect, it varies considerably. Some PPPs have resulted in well-publicised bankruptcies, such as Metronet in the UK, the South Bay Expressway in San Diego, and the Cross-City Tunnel in Sydney, Australia. It is important to remember that some degree of private-sector partner bankruptcy is optimal from a societal risk-allocation perspective. Many PPP bankruptcies, however, impose high transaction costs on governments. Furthermore, many bankruptcies have been instigated by stand-alone subsidiaries, suggesting some degree of opportunistic behaviour by private sector actors (although not technically participants because of the arms-length corporate structure).

Many private sector firms have specialised in PPP projects. This strategy allows firms to be compensated for assuming non-systematic risk and then reducing this risk through diversification. Presumably, these firms earn *at least* a normal return from this business. Given the numerous barriers to entry, the returns are likely to be higher. The empirical evidence concerning private sector returns from individual PPPs is slim, as firms do not publish financial data on individual projects. However, Vecchia, Hellowell, and Gattic (2013) find that

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[6] Interestingly, where the infrastructure is congested, political benefits and social welfare may be aligned by a PPP imposing higher tolls.

private sector participants in PPPs that provide hospital facilities in the UK earn an *excess* return of almost ten percent on average.

Finally, it is important to note that in PPP negotiations, governments often get sucked into an "escalation of commitment" (Ross and Staw 1986; Dietz-Uhler 1996). For a government, there is often more at stake in terms of political outcomes (and symbolism) than there is in terms of the project outcome itself (Edelman 1985; Brown 1994). Politicians have been vulnerable to escalation of commitment for two reasons. First, those initiating the PPP agenda have usually made an ideological commitment to the PPP process. Second, although many of the economic costs on a particular project may be sunk at some given point, the political costs are not sunk. Politicians in executive positions (as well as government PPP contracting agencies) want to avoid the perception that they have made bad investment decisions or that they are vacillating or weak. As a result, even if a PPP develops major problems, political proponents are unable to (credibly) threaten to "pull the plug" on a project. Knowing this, private sector participants may "up the ante", especially if they sense desperation on the government's part. This problem can be most severe when a PPP is still in the construction phase and/or where a project has already started and the contract has not been finalised. The most severe manifestation of the escalation of commitment is government ending up guaranteeing all or a large part of the debt of a project. In the Metronet case, for example, the government ended up guaranteeing 95 percent of the loans (in a project that was 88.3 percent debt financed) (Vining and Boardman 2008b, p. 154–156). Such strategic actions tend to increase private-sector participant profits (or at least reduce their losses) at the expense of the government.

Conclusion

Proponents of PPPs tend to assume that the following premises are true: (1) there is a shortage of public funds available for infrastructure; (2) private-sector providers of private capital can, and will, provide the funds at a similar cost as public capital and then combine it with better (cost-) efficiency to deliver superior (i.e. lower cost) projects; (3) because the private-sector and public-sector are "partners", some of these cost savings will be passed back to the public-sector so that the public sector is better off than it would have been if it had financed and managed a PSC. The PE approach that we have expounded here shows why both public-sector

and private-sector participants in a PPP want to believe these premises. Furthermore, even if they do not, the approach explains why they espouse them; namely, because it is in their self-interest to do so.

The most critical issue is the motivation (i.e. the goals) of governments because all PPPs are government projects. Our basic premise is that governments are vote-maximising entities. The idea that governments will spend now to garner votes while imposing costs on subsequent governments and taxpayers, as we have emphasised, is not a new or startling idea. However, the application of these PE ideas to PPPs does not appear to be as widely recognised or accepted. Indeed, much of the current PPP literature has a "Pollyanna" feel and does not evaluate PPPs based on any clear or explicit behavioural theory or against any clear welfare function.

In this short paper, it is beyond our scope to discuss the "shortage" of public capital premise except to note that the idea is suspect. As we discussed above, in a PPP, the government's cash costs are shifted (later), they are not eliminated. Either way, these costs will be paid for by society as a whole (i.e. primarily taxpayers) sooner or later. The shortage of capital is not likely to be less of a problem in the future than it is now and the willingness of taxpayers to pay tax is not likely to be less in the future than it is now. Whenever costs occur, they should be discounted at the opportunity cost of public funds, which is given by the social discount rate (see Moore, Boardman, and Vining 2013a, 2013b). This rate does not change over time, at least not over the contract period of a typical PPP.

If the PE reality dominates, is there any possibility of better decision-making regarding the choice of project procurement method (i.e. PPP vs. PSC)? We live in hope, and have provided some rules for better contracting elsewhere (Vining and Boardman 2008b). However, the PE perspective suggests that it will be difficult for governments to implement better institutional design. Politicians will remain politicians who seek re-election by providing what appear to be "free lunches", while firms will still try to take advantage of political impulses in order to increase their profitability. There are nevertheless two reasons for believing that better rules have some hope of being implemented. First, politicians face political competition. Dramatically dysfunctional PPP outcomes, such as bankruptcies and abandonment that anger users or voters, end up being costly in political terms (especially if they show up within an electoral cycle), as well as from a social welfare perspective.

Second, there is evidence that ideas, including those relating to better institutional design, do indeed influence voters, stakeholders and governments. In view of this fact, taxpayers that unite in self-organised interest groups, may eventually realise that they have to foot the bill.

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Public-Private Partnerships and Government Debt

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Introduction

Public-Private Partnerships (PPPs) are a special form of public procurement that, under specific circumstances,[2] could be appropriate for realizing efficiency gains in the provision of public goods or services. On the other hand, due to current rules pertaining to public sector accounting and public finance statistics in most countries, PPPs can be used to hide public debt. In view of the perceived or actual deterioration of infrastructure in many countries, and considerable constraints on public budgets, there is a great temptation for politicians (and societies) to use PPPs not as an instrument to improve public procurement, but as a measure to circumvent budget restrictions.

For example, the statistical office of the European Communities (Eurostat 2004, 11) states: *"Normally, an important aim of government's long-term partnerships with non-government units is to avoid immediate capital expenditure, and related borrowing".* Not surprisingly, PPPs tend to be more common in countries where governments suffer from heavy debt burdens,[3] and PPP contracts are sometimes concluded even when conventional procurement seems to be economically advantageous (e.g. House of Commons 2011, Rechnungshöfe 2011). The "price" for the latter policy is, compared to conventional public projects, inefficiency and higher financial burdens in the future.

In this paper, we begin with an analysis of the current rules of government accounting and statistics. In a second step, we present some suggestions to improve these rules in a manner that will prevent the misuse of PPPs; and finally, we conclude with a short discussion.

PPP and government accounting and statistics

Firstly, to understand the issues related to PPP and government accounting (i.e. financial accounting) and statistics (i.e. national accounts), we have to look at the (different) cash flows of traditionally financed public projects and privately financed PPPs. In a next step, we consider how assets and financial obligations (debt) are captured in business accounting, which provides the guidelines for government accounting in the accrual accounting style. Subsequently, we describe the treatment of PPPs in national accounts. Lastly, we present several proposals for improving government accounting and statistics. These aim specifically to reduce or remove the disincentives that exist in current accounting and government statistics.

Cash flows of traditionally and privately financed projects

Traditionally financed projects result in high public sector payments in the early stages of the project and low payoffs in subsequent stages. By contrast, PPP-financed projects shift payments of the public sector to later phases. Figure 1 (similar to Funke, Irwin and Rial, 2013, 8) offers an illustration of this phenomenon. To isolate the effect of time shifting from other effects we consider a stylized case, ignoring differences in interest rates and efficiency.

a) If the project is government-funded then traditional financing (TF) in our example requires, for example, one million EUR in period zero. Under a PPP-contract the government has annual outlays of 100,000 EUR in years one to year ten instead. Therefore, under PPP contracts, the government books show no expenditure (and no related deficit and debt) in period zero. The expenditures appear only at the moment when the government starts to make payments. This always holds in a cash accounting style and, under specific circumstances, even in an accrual accounting style. Thus the described
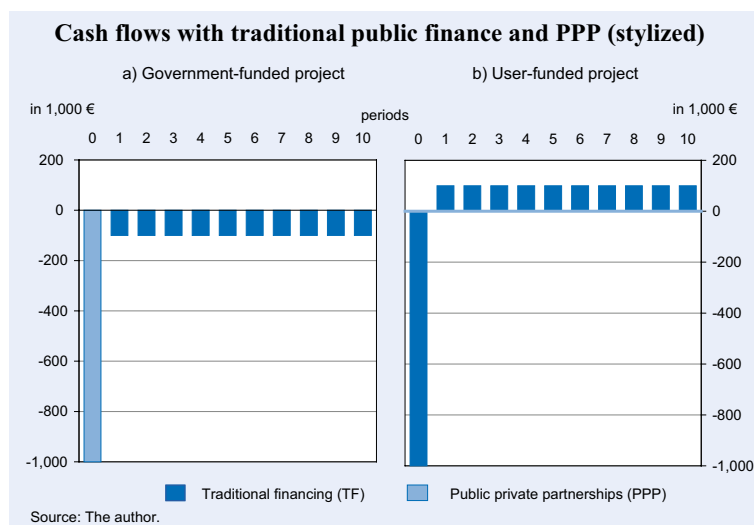

Figure 1

Cash flows with traditional public finance and PPP (stylized)

a) Government-funded project   b) User-funded project

Source: The author.

plete picture. One important difference between cash and accrual accounting is the existence of a balance sheet in the latter case.

In this context the question arises as to whether the PPP related ("underlying") assets and debts have to be disclosed on the balance sheet of the relevant public sector unit or on the balance sheet of the private contractor. From the point of view of a politician who is interested in hiding government deficits and debt, a so-called "off balance sheet treatment" is desirable – meaning that the assets and debt of a PPP contract should not be on the government's balance sheet.

mechanism offers a simple way to shift financial burdens or deficits and debt to the future.

b) If, instead, the project is user-funded, this means that users have to pay fees (tolls or the like) directly to the private contractor, meaning that the public budget is not liable for any payments. The project is virtually "invisible" in the public sector budget, accounting and accounts. Herein, the opportunity costs in the form of missing revenues in posterior years are also not visible in any way. This might be a reason why user-financed PPPs may seem extraordinarily tempting.

Before governments come to a decision about a PPP, they commonly have to evaluate the PPP against conventional project implementation. In project appraisal the discounted cash flow or present value usually serves as a decision criterion. The present value depends on the shape of the cashflows and the discount (interest) rate. Thus, it is no problem to construct PPP related cash flows with a present value higher than for conventional public projects (the present value of the cash flows usually has a negative sign).[4]

PPP in accrual accounting

Figure 1 makes it clear that countries with pure cash accounting may underestimate fiscal costs and risks arising from PPPs. For this reason we have to analyze whether accrual accounting offers a better, more com-

The roots of the treatment of PPP arrangements in government accounting and statistics can be traced back to business accounting for leases. Leases fall somewhere between straight acquisition and straight rent. Purchased assets (and the corresponding debt) must be accounted for on the balance sheet of the purchaser, whereas rented assets have to be accounted for on the balance sheet of the lessor. Leasing contracts basically combine elements of purchasing and elements of rent. Therefore it is necessary to decide whether the assets and debts related to these contracts should be assigned to the lessor or to the lessee.

For that purpose, in business accounting a distinction was developed between a finance lease and an operating lease. This differentiation is based on the referred to "risk and reward approach". In finance lease contracts, the lessee has all or most of the risks and rewards associated with the ownership of the leased asset. Operating leasing, by contrast, is characterized by the fact or assumption that the lessor bears the main risks and opportunities of asset ownership. In the first case the assets and debt have to appear on the balance sheet of the lessee. In the second case the assets and debt are attached to the lessor. The determination of these two types of leases is independent of legal ownership. Underlying this approach is the rationale that accounting should reflect the substance, and not the form, of a transaction ("substance over form").

While the risk and reward approach has been used in international accounting standards for several decades,

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[4] Project appraisal is also vulnerable to manipulation. The audit courts in Germany, for example, frequently discover incorrect project appraisals (see for example Rechnungshöfe 2011).

considerable dissatisfaction has arisen over time (Heald and Georgiou 2011, 221). Under existing accounting standards the majority of leases are not reported on a lessee's balance sheet (IASB 2013a, 2). Therefore financial commitments and risks are not indicated therein and misleading information about the assets and leverage of lessees is given.

These shortcomings are the reason why the International Accounting Standards Board (IASB) initiated a project in 2006 to alter the current standard for leases (IAS 17). In the meantime the IASB has presented a new approach ("right-of-use" model) and, in 2013, a revised draft for a new accounting standard on leases (IASB 2013b). Within this approach there is no longer a differentiation between operating and finance leases and, in principle, all leases have to be included on the balance sheet of the lessee. Both assets and liabilities are to be initially valued at the present value of the lease payments. Thus we can expect the IASB to soon enact a fundamental new standard for leases.

Private sector leasing standards say nothing explicitly about PPPs and are not directed at public sector entities. This lack of guidance on PPP accounting, despite the growing international importance of PPPs, led the IFRS interpretations committee (formerly IFRIC)[5] to fill this gap in 2006 with the IFRIC 12 "Service Concession Arrangements" (IASB 2006). IFRIC 12 uses the criterion of control instead of the risks and rewards approach due to the aforementioned dissatisfaction with IAS 17 (see Heald and Georgiou 2011).

According to IFRIC 12 the economic, but not the legal ownership lies with the party that

a) "controls or regulates what services the operator must provide with the infrastructure, to whom it must provide them, and at what price; and

b) ... controls – through ownership, beneficial entitlement or otherwise – any significant residual interest in the infrastructure at the end of the term of the arrangement" (Heald and Georgiou 2011, 235).

If both these preconditions are satisfied, the PPP related assets will not be reported on the balance sheet of the private operator. Using the criterion of control, it is probably the case that most PPPs would not be categorized as private. For this reason, this approach will result in a significant modification of PPP classification.

But, IFRIC 12 is written exclusively for the private sector, meaning the gap regarding off balance sheet reporting persists for the public sector. Unlike private sector entities, public sector units could, for example, use the risk and reward approach, which would lead to the conclusion that PPP assets and debt belong to the private sector in an economic sense – the opposite conclusion to that provided by the control criterion. This would lead to arbitrage between different accounting standards and result in "orphan assets" and off-off accounting.[6]

This possibility was eliminated by the International Public Sector Accounting Standard (IPSAS) 32 (IPSASB 2011), which is very similar to IFRIC 12 and also applies the control criterion. IPSAS 32 covers government-funded PPPs as well as user-funded PPPs. Now the symmetry between IPSAS 32 and IFRIC 12 prevent the possibility of off-off balance sheet reporting (EPEC 2010, 23).

However, the international standards will have legal effects only if they are voluntarily adopted by national authorities as now in the UK. In reality, most countries deviate from international standards (Funke et al. 2013, 15). This means that the practical impact of the accounting standards on PPPs is very limited at the moment. This allows for gaming different accounting standards and hiding PPP assets und debt. Another important point is the fact that IPSAS 32 is not binding for fiscal accounting and reporting or national accounts. So there is a decoupling of IPSAS and the latter.

It should be noted that the European Community is trying to implement a harmonized public sector accounting standard. The aim of this activity is to improve the quality and the comparability of the fiscal data needed to enforce the growth and stability pact of the Eurozone member states. In this context the statistical office of the European Community (Eurostat) has verified and advocated the suitability of the IPSAS as a starting point for a Union-wide standard (EC 2013), now discussed under the headline-term "European Public Sector Accounting Standards" (EPSAS). Irrespective of the controversial discussion about the necessity and sense of such a costly standard for generating credible fiscal data, the adoption of the IPSAS control criterion for PPP classification would not be in line with the European System of Accounts (ESA 95). Thus Eurostat either has to adapt ESA 95 or to alter the IPSAS guideline regarding this

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[5] The IFRS Interpretations Committee is the interpretive body of the IASB. According to the ISAB homepage *"The mandate of this body is to review issues that have arisen within the context of current IFRS and to provide authoritative guidance (IFRICs) on those issues."*

[6] In the UK there was indeed a real-world example of the absurd situation that enables an off-off balance sheet treatment of PPPs, resulting in PPP assets being displayed nowhere (see Heald and Georgiou 2011).

point at least. The outcome seems to be open at the moment.

PPP in national accounts

In the following, we focus our analysis of national accounts on two statistical standards. Firstly, we consider the International Monetary Fund's (IMF) Government Finance Statistics (GFS); and secondly, we examine the European System of Accounts (ESA 95).[7]

IMF Government Finance Statistics (GFS)

The Government Finance Statistics (GFS), issued by the International Monetary Fund (IMF), is a macroeconomic framework designed for compiling statistics required for fiscal analysis. This framework is described and commented upon in the IMF's Government Financial Statistics Manual (GFSM) 2014, which is an update of the GFSM 2001.

The IMF follows a risk and reward approach. As such, the economic (not legal) owner of a PPP's underlying assets and debt is considered the party that bears the majority of the project's risks and rewards. Some of the risks in acquiring the asset are determined by the degree to which the government controls the design, quality, size, and maintenance of the asset, as well as construction risks. Some risks associated with using the asset are supply and demand risk, residual value and obsolescence risk, and availability risk (IMF 2014, 333). It is assumed that the macroeconomic approach of the IMF is broadly consistent with IPSAS; thus GFSM 2014 and IPSAS 32 should usually have the same implications (IMF 2014, 333; Funke et al. 2013, 15).

Eurostat-rules for PPP accounting

The underlying conceptual framework for categorizing PPPs that is legally binding in the European Union is set out by ESA 95. ESA 95 constitutes the basis of

the Excessive Deficit Procedure (EDP), defined by the Maastricht Treaty in Article 104, which is needed to constrain government deficits and the debt of the Eurozone member states.

Eurostat also issued a detailed guidance on recording PPPs in national accounts (Eurostat 2004, 2013). Herein, Eurostat applied a risk and reward approach similar to the above-mentioned IAS 17 treatment of leases in private sector accounting. The risk assessment of Eurostat concerning government-funded PPPs focusses on the following three main categories of risk (Eurostat 2004, 2; 2013, 270-285):

a) "Construction risk" (covering events such as late delivery, respect of specifications, and additional costs),

b) "availability risk" (covering volume and quality of output), and

c) "demand risk" (covering variability of demand).

If the private party bears a) the construction risk and b) at least one of the other risks (availability or demand), then the PPP related assets should be classified off the balance sheet of the government.

When the risk analysis based on these criteria gives no clear picture ("borderline cases") Eurostat reverts to additional criteria. These could be the clauses pertaining to the disposal of the PPP assets at the end of the contract, government obligations for maintenance costs, repayment of debt in the event of early contract determination, the nature of the private partner (its specialization either in operating leases or in finance leases), classification of the assets (dedicated assets, i.e. assets specifically-designed to supply the service), and so on. The assets and liabilities of user-funded PPPs are considered to be private by Eurostat unless the government finances most of the investment or provides a minimum-traffic or minimum-revenue guarantee to the operator (Eurostat 2013, p. 265).[8]

The Eurostat interpretation of risk and reward differs from that of the IMF and has been rightfully criticized by several authors as "weak" and of a purely "formal nature" (for example IMF 2004, 22; Heald and Georgiou 2011, 240–41; Funke et al. 2013, 15; Engel, Fischer and Galetovic 2014, 12). It is easy to align PPP contracts along the Eurostat criteria in order to obtain an off

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[7] The overarching macroeconomic statistical approach is the System of National Accounts (SNA) 2008. This system was developed and released collectively by the United Nations, the European Commission, the Organization for Economic Co-operation and Development, the International Monetary Fund, and the World Bank Group. The most important difference between the GFS framework and the SNA 2008 is the focus of GFS on the impact of economic events on government finances – taxing, spending, borrowing, and lending - while the 2008 SNA focuses also on the production and consumption of goods and services. As a result, there are significant differences relating to the treatment of own-account capital formation and the degree of consolidation (IMF 2014, 4). This situation may explain differences between ESA 95 and GFS as well, because ESA 95 is harmonized with the System of National Accounts (Eurostat 2013).

[8] Eurostat draws a clear distinction between concessions and public-private partnerships. In the former case most of the revenue of the private partner comes from the final users (therefore termed "user-funded"). By contrast, under PPP contracts the majority of the revenue of the partner comes from the government ("government-funded") (Eurostat 2013, 264). This distinction differs from usual definitions of PPPs, which include concessions in Eurostat's vocabulary.

government balance sheet classification. The construction risk is to be transferred to the private partner in any case, and such partners typically have good opportunities to control this risk. Normally, the availability risk is also not a very demanding burden because this risk can be rather easily controlled by the private partner. In the end, the Eurostat decision actually creates an incentive to transfer the demand risk, inefficiently, to the private sector.[9] The user-funded variant of PPP, called a "concession" in Eurostat's terminology, could also easily be shaped to fulfill the off balance sheet conditions. Therefore, not surprisingly, experience shows that according to Eurostat's criteria, many, probably even most, PPP assets and related liabilities are recorded off governments' balance sheets (Funke et al. 2013, 15).

Improvement of government accounts to reduce or eliminate the bias in favor of PPP

Several recommendations have arisen to improve government accounting and statistics, and thereby to reduce the persisting bias in favor of PPPs. We can divide these proposals (following Funke et al. 2013, 18–24) into three groups: a) applying stronger tests for PPP classification in fiscal accounting or a general ceiling for PPPs, b) improvements in budgeting for PPPs, and c) requiring supplementary information about PPPs in financial and fiscal accounting.

Improvement of the classification of PPPs

Deficit and debt caps are usually set by "headline fiscal indicators" like fiscal deficit and debt (analogous to the Maastricht treaty). Therefore, a self-evident proposal is to introduce an unbiased classification of PPPs in order to prevent any unjustified exclusion of PPPs from coverage within these indicators. In practice, this means the application of better and stronger criteria than those currently used by Eurostat or in ESA 95. Although not perfect, the usage of GFS or IPSAS criteria would constitute a significant improvement relative to lax interpretations such as those allowed for in ESA 95.

In another approach, some authors (see Engel et al. 2014) have proposed always treating PPP assets and liabilities in the same way as public investments. This seems to be very similar to the new leases approach of the IASB. Then at least all government-funded PPPs would have to

be recorded with their present value on-balance sheet for the government side.

Another reform possibility could be the establishment of PPP-ceilings. Funke et al. (2013, p. 24) highlight the fact that some countries have introduced ceilings for PPP, say three percent or five percent of net current government revenue or of GDP. However, such ceilings would not necessarily remove the problem of keeping PPPs off-record or manipulating the underlying indicators such as GDP. Thus ceilings could only be an additional measure taken along with one of the aforementioned measures.

Improving the way budgeting deals with the fiscal implications of PPPs

The budgeting process provides another starting point for controlling PPP usage. Testing for value for money and the affordability of any project, including PPPs, is an obvious necessity and should be considered as a matter of course. However, the former is vulnerable to manipulation, while the latter requires information about the future fiscal impacts of a given PPP. For user-funded PPPs it is absolutely imperative to include shadow tolls, or the foregone government earnings, in these calculations.

All this information could be provided by disclosing the financial commitments incurred due to a given PPP over the period of its contract. The problems here are again manipulation, hiding this information in the appendices of the budget, and the non-binding character of PPP obligations for parliamentary decisions. Hence this measure could also only be an additional, supporting procedure.

Disclosing supplementary information about PPP arrangements

Governments can, voluntarily or as required by law, provide additional information about PPPs to the parliament and the public. This may include, for example, long-term projections of PPP related expenditures, shadow tolls, or other predictable cash flows between the PPP contractors and the government (see Funke et al. 2013, 19).

Finally, governments could disclose PPP contracts and their details on their websites. Due to commercial con-

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[9] Risks of demand should generally be transferred to the public sector, because private subjects cannot effectively alter this risk and the public sector has more capacity for risk-bearing.

fidentiality, it may not be possible to provide the public with all information on every single PPP contract, but in any case the financial impact of PPPs on the public budget must be released. For the sake of comparability, the information given by the government needs to be standardized. However, the provision of supplementary PPP material on its own is not likely to have a significant countervailing effect on the misuse of PPP arrangements, as such information can only support budgeting and compliance with fiscal rules.

Discussion

Today the co-existence of several different standards for financial accounting and government accounts can be observed. The financial accounting standard concerning the reporting of Public-Private Partnership (PPP) related assets and debt by private contractors is IFRIC 12 (named by the IFRS interpretations committee). IFRIC 12 uses a control approach (who controls the underlying asset?). The twin of IFRIC 12 applicable to the public sector is the International Public Sector Accounting Standard (IPSAS) 32. Applying both IFRIC 12 and IPSAS 32 would lead to a generally symmetric and consistent treatment of PPP assets and debt either on the balance sheet of the private contractor or on the balance sheet of the public sector. The control criterion, used in both cases, probably would assign most PPP arrangements to the public sector.

On the side of government accounting, designed for the purpose of generating fiscal data, we discussed the Government Finance Statistics (GFS), developed by the International Monetary Fund (IMF), and the European System of Accounts (ESA 95), which is directed at the member states of the European Union. These approaches apply different versions of the risk and reward approach (who bears the main risk of the underlying assets?). The stronger GFS interpretation has similar implications as EPSAS 32, while the weaker interpretation of Eurostat makes it easy to design PPP arrangements so that they fulfill the "as if private" criteria.

The adoption of the accounting standards is voluntary, as are – in part – the standards for national accounts. Thus, there is a very mixed picture of PPP accounting in different countries. In the worst case the government and the private actors are able to play off private standards against government standards. As a result, PPP assets and debt may appear neither on the private side nor on the public side ("orphan assets").

As long as the standards make it easy to shift PPPs to the private sector, or to nothingness, governments are very tempted to use PPP arrangements not to improve public procurement, but to hide deficits and debt or to circumvent deficit and debt caps, such as those established, for example, by the treaty of Maastricht.

To close the existing gaps left by current accounting standards two kinds of measures are basically called for. The first action needed is the introduction of stronger and more consistent criteria both in financial accounting and fiscal accounting. For example, using the principles of EPSAS 32 or the "right of use approach" described in the new release of the International Accounting Standard (IAS) 17 would be a significant improvement compared to ESA 95. The second procedure needed is to improve the budgeting process. Before decisions about public projects (however procured) are made, value for money and affordability must be unconditionally and comprehensibly proven. The fiscal consequences of existing and planned contractual commitments must be shown, covering the complete duration of the contracts. Lastly, while additional information about PPP contracts may be helpful, it is of minor importance. Such information will have no significant impact without improved accounting and budgeting procedures.

Thus we cannot complain that there is a lack of suitable means to address the current shortcomings. The main problem is that politicians and governments have to restrict themselves to a sustainable fiscal policy, and they cannot be expected to do so voluntarily. However, contemporary politicians could impose constraints on politicians in the future. The introduction of the "debt brake" ("Schuldenbremse") in Germany is an example of such a path, one that could easily be emulated by other countries.

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Using Bankruptcy to Reduce Foreclosures[1]

Wenli Li[2], Ishani Tewari[3] and
Michelle J. White[4]

Since the beginning of the mortgage crisis and the Great Recession, an unprecedented 4.2 million home foreclosures have been completed in the US – an average of 850,000 per year from 2008 to 2013 compared to 250,000 per year from 2000 to 2006. Other countries such as Spain have also seen very large numbers of foreclosures during the past few years (see Smith and Penty 2012). Governments have tried various measures to reduce foreclosures: in the US, the Bush and Obama administrations both offered programs that compensated lenders if they modified underwater mortgages by reducing homeowners' monthly payments. But these programs were largely unsuccessful because lenders' participation was voluntary and few lenders were willing to cut mortgage debt.[5]

We examine an alternative approach to reducing foreclosures – called mortgage strip-down – which would allow homeowners to have the amount owed on their mortgages reduced to the current market value of the house if their mortgages are underwater and they file for bankruptcy. Lenders' consent would not be required. In 2009, the Obama administration proposed legislation to introduce the strip-down of residential mortgages in bankruptcy, but Congress did not enact it.

Mortgage strip-down is attractive from an economic standpoint, because it would make homeowners better off without making lenders worse off. Lenders would not be harmed, because they would receive as much as if they foreclosed, and homeowners would be made better off because they would not be forced to move. Mortgage strip-down would also reduce an inefficiency in the mortgage market: namely that lenders foreclose too often because some of the costs of foreclosure are externalized. The externalized costs are borne by neighboring homeowners whose homes fall in value when foreclosures occur, since "zombie" homes remain vacant for long periods, fall into disrepair, and cause neighborhood blight (Campbell, Giglio and Pathak 2011 and Center for Responsible Lending 2013). Local governments also bear part of the cost, since they lose property tax revenue when foreclosures occur and are then forced to cut spending on local public goods.

Another argument for allowing mortgage strip-down has been made by economists including Summers (2014) and Mian and Sufi (2014): the US government's bank-oriented response to the 2008 financial crisis left households with too much debt, leading to low consumer spending levels and years of stagnation for the economy. They argue that using mortgage strip-down to reduce household indebtedness would speed up economic growth by cutting household debt and raising consumer spending.

But mortgage strip-down has an important drawback, which is that it would erode creditor protection by forcing lenders to give up their most important contractual remedy for default. This could result in lenders' reducing the supply of mortgage credit and raising interest rates. Studies of credit markets have found that when the law favors debtors and/or when creditors have greater difficulty in enforcing loan contracts in court, lenders respond by reducing credit supply and raising interest rates (La Porta, Lopez-de-Silanes, Shleifer and Vishny 1997; Laeven and Majnoni 2005; Jappelli, Pagano and Bianco 2005; Pence 2006 and Visaria 2009). When bankruptcy law is more pro-debtor, the same effects have also been shown to occur in consumer and small business credit markets in many countries (Gropp, Scholz and White 1997; Berkowitz and White 2004

and Davydenko and Franks 2008). More specifically, a mortgage lenders' advocacy group, the Mortgage Bankers Association, argued recently that if mortgage strip-down were allowed in bankruptcy, US mortgage lenders would raise interest rates by at least 1.5 percentage points, or 17 percent (Kittle 2007).

Our recent paper (Li, Tewari and White 2014) examines whether and how much the introduction of mortgage strip-down in bankruptcy would reduce the availability of mortgage credit. We do this by using a series of decisions by lower courts in the US that allowed mortgage strip-down to occur in parts of the US starting in the late 1980s, and two decisions by the US Supreme Court that abolished mortgage strip-down everywhere in the US in the early 1990s. The timing of these judicial decisions can be taken as plausibly exogenous to market conditions. Exploiting the temporal and cross-sectional variation generated by these policy shocks, we use a difference-in-difference approach that compares lenders' response in affected versus unaffected regions following each court decision.

Our paper also examines how markets respond to court decisions that change the law. Economists routinely study how markets respond to changes in the law that are adopted by legislatures and regulatory agencies,[6] but there are far fewer studies of how markets respond when judges change the law in the process of deciding legal disputes.[7] There are even fewer studies that examine whether markets respond differently to decisions of lower-level versus higher-level courts.[8] Our study is among the first to examine how markets respond to the decisions of both lower-level US courts and the US Supreme Court.

The US court system and US consumer bankruptcy law

Let us turn first to the organization of Federal courts in the US. Bankruptcy filings must be made in one of the federal bankruptcy courts: each US state is divided into one to four bankruptcy courts. If a decision by a bankruptcy court judge is appealed, the appeal goes first to the federal district court that covers the same region

as the bankruptcy court. If a decision by a federal district court judge is appealed, the appeal goes to the US Court of Appeals (circuit court) that covers the relevant region; there are 11 circuit courts in the US, each covering between two and nine states. Finally, if there is an appeal from a circuit court decision, it goes to the US Supreme Court. Figure 1 shows a map of the Federal district and circuit court regions.[9]

When a district or bankruptcy court case is decided, the judge's decision may change the law in the district. But since the decision applies only within the district, it generates differences across districts within a circuit court region, since the law does not change in other districts. These differences of law within a circuit are often resolved by the circuit court deciding an appeal from the lower court decision. When the circuit court issues a decision, it applies everywhere within the circuit court region and therefore makes the law uniform within the circuit. But since circuit court decisions apply only within their regions, they create differences of law across circuits. These differences are resolved by the US Supreme Court accepting an appeal on the question. When the Supreme Court makes a decision, it applies everywhere in the US and thus eliminates cross-circuit differences in the law.

There are two separate personal bankruptcy procedures in the US – Chapter 7 versus Chapter 13.[10] Under the Chapter 7 procedure, some or all of debtors' unsecured debts are discharged. The debtors must give up all of their assets above an exemption level, but they are not obliged to use any of their future income to repay their debt – thus they receive a "fresh start." Because mortgage loans are not changed or discharged in Chapter 7, the procedure does not directly help financially distressed homeowners save their homes. Nonetheless, homeowners benefit from filing for bankruptcy, since the discharge of unsecured debt increases their ability-to-pay and, if they wish to keep their homes, they can use the increase to avoid defaulting on their mortgages or to repay the arrears.[11]

[6] Examples in the labor economics and finance fields are Neumark, Schweitzer and Wascher (2004) and Balasubramanium and Cyree (2014).
[7] An example is Cooper and Tomlin (2008), which analyzes the effect of a US Supreme Court decision that gave federal judges the responsibility of excluding unreliable expert testimony.
[8] An example is Goodman and Levitin (2014), who also study the effect of mortgage strip-down decisions by lower-level versus upper-level courts.

[9] Some bankruptcy court appeals go to a Bankruptcy Appellate Panel for the district, before going to Federal district or circuit court. Only a small minority of judges' decisions in bankruptcy cases are appealed.
[10] US bankruptcy law was reformed in 2005, but this description of bankruptcy law is for the pre-reform period. See White (2005) for a discussion of bankruptcy law, White and Zhu (2010) for a discussion of the effect of Chapter 13 bankruptcy on homeowners and Li, White and Zhu (2011) for an argument that the 2005 bankruptcy reform caused default rates on mortgages to rise and contributed to the bursting of the US housing bubble and the mortgage crisis.
[11] Deficiency judgments are obligations by homeowners to pay the difference between their mortgage obligation and the sale price of the home in foreclosure. They are permitted in some US states. Another benefit of filing for bankruptcy is that deficiency judgments are discharged. See Kuchler and Stroebel (2009) for a discussion of this issue.

Figure 1

Geographic boundaries of United States Courts of Appeals and United States District Courts

Courts of Appeals (circuit courts)
1 2 3 4 5 6 7 8 9 10 11

Source: United States Courts.
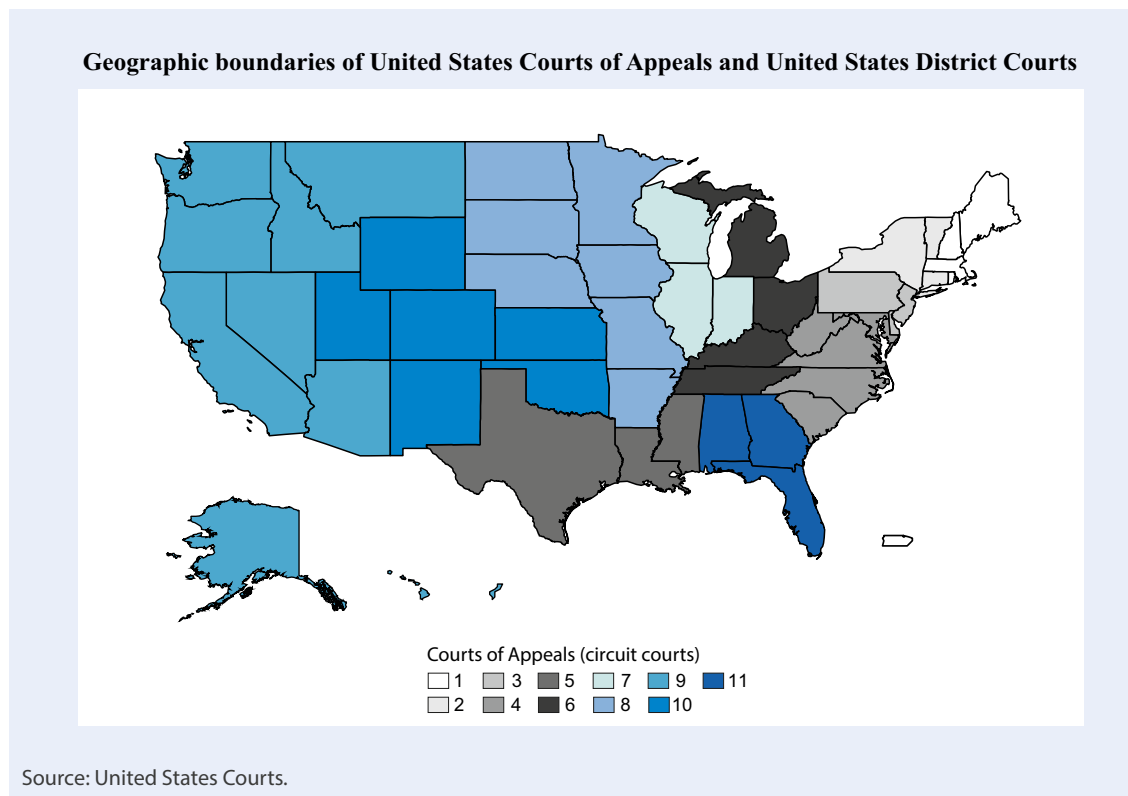
The other personal bankruptcy procedure is Chapter 13. Here debtors must propose a plan to repay some of their debt from future income, but they are not obliged to give up any of their assets. Repayment plans must last for three to five years. Homeowners who are in default on their mortgages can spread repayment of their mortgage arrears over the period of their repayment plans and, if they complete all the payments, then their original mortgage contracts will be reinstated. The plan also covers unsecured debt, and debtors may propose repaying as little as one percent of the amount owed. Only the bankruptcy judge must approve the repayment plan. Thus, homeowners can use Chapter 13 to save their homes and have some of their unsecured debt discharged. This procedure is valuable to homeowners who are in financial distress, but wish to save their homes.

There were two separate groups of legal decisions concerning the strip-down of mortgages in Chapter 7 versus Chapter 13 bankruptcy[12]. Starting in the 1980s, some district and bankruptcy courts began allowing the strip-down of residential mortgages in Chapter 7 bankruptcy and appeals of these decisions led three circuit

courts – the 7th, 11th, and 3rd – to allow mortgage strip-down in Chapter 7. These decisions occurred between 1987 and 1989. An additional circuit – the 10th – decided not to allow strip-down in Chapter 7 in 1990 and, in 1992, the Supreme Court abolished it everywhere in the US. There was a similar sequence of court decisions at approximately the same time concerning strip-down of mortgages in Chapter 13 bankruptcy. Following lower-level court decisions to allow it, four circuit courts – the 9th, 3rd, 10th, and 2nd – decided to allow it. These decisions occurred between 1989 and 1992. An additional circuit – the 5th – decided not to allow it in 1992 and the US Supreme Court abolished it in 1993. Table 1 gives the dates of the circuit court and Supreme Court decisions. We use this sequence of legal decisions to test the effect of strip-down in bankruptcy on mortgage markets.

Predictions

How is the availability of mortgage strip-down in bankruptcy predicted to affect mortgage credit? The availability of strip-down affects both the supply and demand sides of the mortgage market. On the demand side, mortgage strip-down reduces the downside risk that homeowners face when they obtain a mortgage because,

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[12] See Eggum, Porter and Twomey. (2008), Levitin (2009) and Scarberry and Reddie (2010) for discussions of mortgage strip-down from a legal perspective.

Table 1

Circuit and Supreme Court decisions concerning mortgage strip-down in Chapter 7 and Chapter 13 bankruptcy		
Court	Type of decision	Date
7th Circuit	Allowed strip-down in Chapter 7	July 6, 1987
11th Circuit	Allowed strip-down in Chapter 7	January 12, 1989
3rd Circuit	Allowed strip-down in Chapter 7	November 29, 1989
10th Circuit	Did not allow strip-down in Chapter 7	July 11, 1990
Supreme Court	Abolished strip-down in Chapter 7	January 15, 1992
9th Circuit	Allowed strip-down in Chapter 13	October 4, 1989
3rd Circuit	Allowed strip-down in Chapter 13	February 9, 1990
10th Circuit	Allowed strip-down in Chapter 13	January 17, 1991
2nd Circuit	Allowed strip-down in Chapter 13	April 21, 1992
5th Circuit	Did not allow strip-down in Chapter 13	August 13, 1992
Supreme Court	Abolished strip-down in Chapter 13	June 1, 1993

Source: The authors.

if housing values fall enough to wipe out their home equity, they can have their mortgage obligations reduced in bankruptcy. This reduction in risk raises risk-averse homeowners' willingness to borrow and their demand for mortgage loans. It can also draw less credit-worthy borrowers into the mortgage market. However, because the availability of strip-down in bankruptcy reduces homeowners' downside risk, they default on their mortgages more often. This increases lenders' risk and may cause them to reduce the supply of credit. Overall, the increase in demand and the reduction in the supply of mortgage credit implies that interest rates are predicted to rise when mortgage strip-down is in effect. Also, since homeowners' default probabilities rise, lenders may tighten credit availability on the extensive margin by reducing the approval rate for mortgage applicants.[13]

These predictions apply to mortgage strip-down both in Chapters 7 and 13. An additional question is which type of strip-down is likely to have a larger effect on credit markets. During the early 1990s, less than one third of personal bankruptcy filings occurred under Chapter 13 and debtors' cost of filing was much higher under Chapter 13.[14] Both of these considerations suggest that homeowners would be more likely to seek mortgage strip-down in Chapter 7 bankruptcy and therefore that the availability of strip-down under Chapter 7 would

have a larger effect on mortgage markets. On the other hand, mortgage debt is accelerated to the present in Chapter 7 bankruptcy, so that the entire amount owed on the mortgage (principle plus interest plus penalties for default) must be repaid immediately. This means that, even with the benefit of strip-down, most homeowners in Chapter 7 would find it impossible to keep their homes because they cannot repay the entire mortgage balance even at the stripped-down level. This consideration thus goes in the opposite direction. Overall, it is an empirical question whether strip-down under Chapter 7 or Chapter 13 has a larger effect on mortgage markets.

A similar question is whether Supreme Court or circuit court decisions are predicted to have a larger impact on mortgage markets. Because the two types of courts make the same change in mortgage terms, but in the opposite direction, we expect that markets will respond equally, but in the opposite direction. However, Supreme Court decisions are more highly publicized and expected to persist for longer, which suggests that they may generate a large market response. This again is an empirical question for which we do not have a clear prediction.

Data, specification and results

Our empirical work examines how mortgage strip-down under both Chapters of US bankruptcy law affects the terms of new mortgages, using data from the period of the late 1980s and early 1990s when strip-down was allowed. We make use of the fact that the timing of the judicial decisions can be taken as plausibly exogenous to market conditions. This is because US courts only decide particular legal questions when they receive a case involving the question, or an appeal from a lower court decision involving the question, and the US Supreme Court decides a particular legal question only when it receives and accepts an appeal from a circuit court decision involving the question. The timing of Supreme Court decisions is particularly exogenous to market conditions because it often waits to accept an appeal until there are circuit court

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[13] The availability of strip-down also affects lenders' losses conditional on default. These losses may be smaller under strip-down, because foreclosure is averted. The predictions assume that the availability of strip-down does not reduce lenders' losses when default occurs by enough to more than fully offset the extra losses they bear due to the rise in the default probability.

[14] Homeowners' bankruptcy costs in the early 1990s were around USD 600 for Chapter 7 versus USD 1,600 for Chapter 13.

decisions on the issue that go both ways.

Our data are taken from two sources: the Home Mortgage Disclosure Act (HMDA) data, which cover nearly all home mortgage applications in the US, and the Monthly Interest Rate Survey (MIRS), which is a monthly sample of conventional mortgages originated during the last week of each month. The HMDA data tell us whether home mortgage applications were approved by the lender and the MIRS data give us interest rates on originated mortgages. Both data sets are at the individual mortgage level and we add information on whether mortgage strip-down was permitted under Chapter 7 or Chapter 13 at the relevant date and place, plus other regional economic variables. We estimate separate difference-in-difference models for each circuit court decision to allow mortgage strip-down and the two Supreme Court decisions to abolish mortgage strip-down. The variables that we consider are approval rates for mortgage applications and interest rates on mortgages. We use probit for the approval rate regressions and OLS for the interest rate regressions. The main explanatory variable of interest in each regression is a *Treated*Post* interaction. For the regressions explaining the effect of circuit court decisions, *Treated* is a dummy for mortgages in a particular circuit court region and *Post* is a dummy for months after the circuit court decision to allow strip-down. Thus the coefficient of the interaction term equals the change in approval rates or interest rates in the region affected by the circuit court decision relative to other regions where the law did not change. We predict that when mortgage strip-down is allowed, approval rates for mortgage applications will fall and interest rates on new mortgages will rise. As placebo tests, we also run the same models for the two circuit court decisions not to allow strip-down, where we predict that the interaction term will be insignificant. For the regressions explaining the effects of the two Supreme Court decisions to abolish strip-down, *Treated* is a dummy for mortgages in the circuit court regions where mortgage strip-down was allowed and *Post* is a dummy for months after the relevant Supreme Court decision. The coefficient of the interaction term thus measures the change in approval rates or interest rates in the

Table 2

Effects of Court decisions to allow and abolish mortgage strip-down in Chapter 7 and Chapter 13 bankruptcy

	Approval rate	Interest rate
Chapter 7 strip-down decisions:		
7th Circuit decision to allow strip-down	--	-0.24 (0.10)
11th Circuit decision to allow strip-down	--	-0.14 (0.73)
3rd Circuit decision to allow strip-down	--	0.066 (0.63)
10th Circuit decision not to allow strip-down	-0.0087 (0.25)	0.33 (0.45)
Supreme Court decision to abolish strip-down	-1.5** (0.04)	-0.46 (0.23)
Chapter 13 strip-down decisions:		
9th Circuit decision to allow strip-down	--	0.089* (0.10)
3rd Circuit decision to allow strip-down	--	0.015 (0.23)
10th Circuit decision to allow strip-down	-1.3 (0.45)	0.028 (0.89)
2nd Circuit decision to allow strip-down	0.26 (0.87)	0.083 (0.49)
5th Circuit decision not to allow strip-down	-0.77 (0.32)	-0.04 (0.71)
Supreme Court decision to abolish strip-down	0.90** (0.02)	-0.23*** (.01)

Source: Authors' calculations. *p*–values are in parentheses.

regions where the Supreme Court decision changed the law from allowing to abolishing strip-down, relative to regions where strip-down was never allowed. We predict that when mortgage strip-down is abolished, approval rates for mortgage applications will go up and interest rates on new mortgages will go down – the opposite of the predicted effects for the circuit court decisions.

To avoid confounding the effect of the court decisions with each other and with other trends in mortgage markets, we use short sample periods that cover three months before to three months after each court decision. However, because HMDA data are not available at the individual mortgage level prior to 1990, we can only estimate the approval rate model for court decisions starting in 1990.

The results are given in table 2, where each figure is the coefficient of the *Treated*Post* interaction in a separate regression.[15] *p*-values are given in parentheses and ***, ** and * indicate statistical significance at the one percent, five percent and ten percent levels, respectively. Surprisingly, we find little effect on mortgage interest rates of the circuit court decisions to allow strip-down of mortgages in Chapter 7 – none of the results in the first three rows is statistically significant and two of the three interest rate changes have the wrong signs. The

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[15] See our NBER working paper for additional information concerning the specification and additional results. Regional economic controls include the lagged metropolitan area unemployment rate, the metropolitan area median income, the house price growth rate, and whether the bankruptcy filing rate in the district is in the top decile nationally.

decision of the 10th Circuit Court not to allow strip-down also had no significant effect. The Supreme Court decision to abolish strip-down under Chapter 7 did result in a fall in mortgage interest rates of 46 basis points, which is in line with our predictions, but the effect is not significant (*p* = 0.23). And the effect of the Supreme Court decision on approval rates, which is statistically significant, goes in the wrong direction: approval rates fell by 1.5 percentage points, or two percent (*p* = 0.04). These results suggest that allowing and later abolishing strip-down under Chapter 7 had little effect on the terms of mortgages, presumably because few homeowners used the procedure and therefore default rates did not change. However, we do not have a good explanation for why lenders cut approval rates for mortgage applications after the Supreme Court abolished strip-down in Chapter 7.

The results for strip-down under Chapter 13, given in the bottom half of table 2, are more in line with our expectations. Lenders responded to the 9th Circuit Court decision to allow strip-down under Chapter 13 – the earliest of the circuit court decisions – by raising interest rates nine basis points, or 1.2 percent, and the result is marginally statistically significant. But they did not respond in a similar way to the three subsequent circuit court decisions to allow strip-down; there also was no significant response by lenders to the 5th Circuit Court decision *not* to allow strip-down under Chapter 13. Lenders also responded in the predicted direction to the Supreme Court decision to abolish strip-down under Chapter 13 and their responses were statistically significant: mortgage approval rates rose by 0.9 percentage points, or one percent, and interest rates fell by 23 basis points, or three percent, following the decision. Both results are statistically significant.

These results allow us to rule out two hypotheses. One is that lenders did not respond to the circuit court decisions to allow mortgage strip-down under either Chapter, because they did not predict that strip-down would affect their returns from lending. This hypothesis is contradicted by the fact that lenders did respond significantly to the Supreme Court's decision to abolish mortgage strip-down under Chapter 13, and they would not have done so if strip-down had no ef-

Table 3

Effects by circuit court region of the Supreme Court decisions to abolish mortgage strip-down in Chapter 7 and Chapter 13 bankruptcy

	Approval rate	Interest rate
Supreme Court Chapter 7 decision:		
Circuit 7	-1.01 (0.44)	-0.604 (0.16)
Circuit 11	-1.07 (0.28)	-0.125 (0.78)
Circuit 3	-2.60*** (0.01)	-1.2** (0.02)
Supreme Court Chapter 13 decision:		
Circuit 9	1.1*** (0.01)	-0.31*** (0.01)
Circuit 3	1.5** (0.04)	-0.27 (0.14)
Circuit 10	-0.9 (0.39)	-0.19 (0.47)
Circuit 2	1.2* (0.09)	0.24 (0.24)

Source: Authors' calculations. *p*–values are in parentheses.

fect on their profits. A second hypothesis is that lenders did not respond to the introduction of mortgage strip-down under either Chapter because they were uninformed about the lower court decisions to allow it. But this hypothesis is contradicted by the fact that lenders responded significantly to the first of the circuit court decisions to allow strip-down under Chapter 13 – that of the 9th Circuit.

We also find considerable geographic heterogeneity in lenders' response to the Supreme Court decisions. In table 3, we give the results of rerunning the Supreme Court regressions shown in table 2, but with separate interaction terms that allow lenders' response to differ across circuits. The results, shown in table 3, show that only lenders in the 3rd circuit region responded to the Supreme Court decision to abolish strip-down under Chapter 7. In contrast, lenders in the two other circuit court regions where the law changed – the 7th and 11th – did not change lending terms significantly. Turning to the Supreme Court decision to abolish strip-down in Chapter 13, lenders' response was more nationally uniform. Here, lenders in three of the four affected circuit court regions raised approval rates significantly and lenders in all four affected circuit court regions lowered interest rates following the Supreme Court decision, although only the change in the 9th circuit region was statistically significant. In the 9th circuit region, approval rates rose by 1.1 percentage points, or 1.5 percent, and interest rates fell by 31 basis points, or five percent; both changes were strongly significant.

Overall, we conclude that lenders responded more strongly to the availability of strip-down under Chapter 13 than under Chapter 7, that they responded more strongly to Supreme Court than circuit court

Table 4

Effects on interest rates of circuit and Supreme Court decisions to allow and abolish mortgage strip-down in Chapter 7 and Chapter 13 bankruptcy long-period sample	Interest rate
Strip-down allowed in Chapter 7	-0.042 (0.56)
Strip-down allowed in Chapter 13	0.17*** (0.007)

Source: Authors' calculations. *p*–values are in parentheses.

decisions, and that their responses varied substantially across geographic markets.

As an additional check on our regressions, we also ran a regression using a long time period that starts before the earliest circuit court decision to allow strip-down and ends after the last Supreme Court decision to abolish strip-down (January 1987 through December 1996). In this regression, the *Treated*Post* dummies are replaced by two separate dummy variables: one for mortgages that originated when/where mortgage strip-down was allowed under Chapter 7, and one that does the same for mortgage strip-down under Chapter 13. Here the introduction and abolition of strip-down are constrained to have equal and opposite effects, but strip-down under Chapter 7 is allowed to have a different effect than strip-down under Chapter 13. Because the time period begins before HMDA data are available, we only run this regression for interest rates.

Table 4 shows the results. Here we find that the availability of mortgage strip-down under Chapter 7 does not significantly affect interest rates, while the availability of strip-down under Chapter 13 is associated with an increase in mortgage interest rates of 16 basis points – less than two percent – and the result is strongly significant. Thus the long-period and short-period results are broadly consistent in that both show that strip-down under Chapter 7 has no effect on interest rates, while strip-down under Chapter 13 is associated with a small increase in interest rates. But the long-period results hide the geographic variability and the stronger response of lenders to Supreme Court than to circuit court decisions.

Conclusion

Our main conclusion is that the availability of mortgage strip-down under Chapter 7 has no effect on the terms of new mortgages, but the availability of mortgage strip-down under Chapter 13 is likely to raise interest rates and reduce mortgage approval rates by a small amount,

probably on the order of one to two percent. The effect on interest rates of allowing strip-down under Chapter 13 is far smaller than the 17 percent increase predicted by the Mortgage Bankers' Association. Because reducing foreclosure has important positive effects for current homeowners and only small negative effects on the terms of future mortgage loans, we conclude that it would be a useful new policy tool to reduce foreclosures when future housing bubbles burst. Our other results are that lenders' response to mortgage strip-down is geographically quite heterogeneous, but lenders respond more strongly to Supreme Court than to circuit court decisions. Although our results are specific to the features of bankruptcy law in the US, the approach is potentially relevant to other countries that have had mortgage crises and high levels of foreclosure. However, the specific details of a mortgage strip-down program would be different in other countries and might occur outside of bankruptcy.

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Behind the Courts' Walls: Empirical Insights from Slovenia

Peter Grajzl[1]

Introduction

Courts are central institutions underpinning the capitalist market system. Economic theory has traditionally *assumed* the existence of well-functioning courts that secure property and contractual rights. It is only relatively recently, with the revival of interest in the role of institutions and governance, that the functioning of courts has received greater attention from economists (Johnson, McMillan and Woodruff 2002; Djankov et al. 2003; Shleifer 2012).

Yet empirical evidence on the performance of courts worldwide is scant. This is especially true in the context of post-socialist and developing countries, where both the use and the working of courts differ substantially from that in the more mature capitalist systems (Hendley, Murrell and Ryterman 2000; Johnson et al. 2002; Djankov et al. 2003; Pyle 2006; Lambert-Mogiliansky, Sonin and Zhuravskaya 2007; Chemin 2009). Evidence on the activity of post-socialist courts and the behavior of judges based on original court data (Murrell 2001), as opposed to indirect, survey-based evidence, is particularly scarce.

This research report summarizes empirical results and policy insights into the functioning of courts and the behavior of judges in post-socialist Slovenia. The showcased research (Dimitrova-Grajzl et al. 2012a, 2012b; Dimitrova-Grajzl, Grajzl and Zajc 2014a) draws on restricted-access, court-based data to provide one of the very first comprehensive empirically-grounded accounts of the inner workings of courts in the Central and Eastern Europe and the former Soviet Union.

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Slovenia is an interesting and underexplored case for the study of judiciary. A member state of the EU since 2004, Slovenia underwent a relatively smooth economic transition, but failed to implement an effective judicial system. Court backlogs and delays, as well as judicial corruption, have been a pervasive concern. Businesses in Slovenia perceive the lack of an effective judiciary as an obstacle that is greater than the burden of high taxation, excessive regulation, and inconsistent availability of credit (Anderson, Bernstein and Gray 2005). Insights into the performance of courts and judicial decision-making in Slovenia are therefore relevant for the broader post-socialist region, as well as for those EU member states that are likewise struggling with their judicial systems (Jean and Jorry 2013).

The determinants of court output

A crucial aspect of judicial efficiency (Ramello and Voigt 2012) is the ability of the court system to facilitate the resolution of disputes through the resolution of filed cases. The number of resolved cases is a purely quantitative measure of court activity. In particular, the sheer volume of resolved cases does not directly reflect on the quality of court decisions. Nevertheless, focusing on an entirely quantitative measure of court activity is appropriate in the case of legal systems where improving the ability of courts to resolve cases within a reasonable time is a high policy priority.

What are the key drivers of total court output measured by the number of resolved cases? An understanding of the relative importance of the factors that affect the volume of case resolution in courts provides valuable information regarding the possible policy measures aimed at decreasing court delays.

A simple conceptual framework suggests that the number of resolved cases depends on the court's resources as proxied by the number of serving judges and the demand for court services as proxied by the court's caseload. Accordingly, a frequent policy presumption underpinning attempts to reduce court delays is that increasing judicial staffing increases court output: ceteris paribus, more judges should dispose more cases. Following this

Figure 1

Resolved cases, caseload and number of judges

Source: Dimitrova–Grajzl et al. (2012a).

incentives, the incumbent judges simply decrease their work effort upon the appointment of additional judges. Any increase in the number of resolved cases due to new judicial appointments is therefore directly offset by a decrease in the number of resolved cases by the incumbent judges. Using a different empirical method, Beenstock and Haitovsky (2004) arrive at a similar conclusion in their analysis of the Israeli judiciary.

Factors shaping judicial incentives for case resolution

Recent positive theories (Posner 1993) suggest that judges are not titans striving to defend the rule of law, but rather ordinary self-interested individuals who, much like everybody else, care about income and leisure. These conclusions from the analysis of judge-level data from Slovenian first-instance courts (Dimitrova-Grajzl et al. 2012b) echo this perspective.

logic, the goal of Slovenian judicial reforms implemented around the year 2005 was to substantially increase the number of judges in the court system.

Figure 1 tracks the evolution over time of the court-level means of the number of resolved cases, caseload, and the number of judges for Slovenian local courts of first instance. The figure portrays two interesting patterns: firstly, the mean number of resolved cases closely tracks the mean caseload. Secondly, the mean number of resolved cases and the mean number of judges appear to co-evolve much less closely.

The patterns in Figure 1, of course, do not allow to draw immediate conclusions about the causal relationships (or lack thereof) between the variables of interest. To investigate causality, Dimitrova-Grajzl et al. (2012a) apply panel data methods and use an instrumental variable approach. The results suggest that, in contrast to conventional wisdom, court resources as proxied by judicial staffing do not affect total court output. Instead, the primary driving force of court output in Slovenia is demand for court services. Rather than suppressing judicial productivity due to a congestion effect, an increase in the caseload incentivizes judges to exert greater effort and resolve more cases.

Why might court output in Slovenia fail to respond to an increase in the number of judges in the judicial system? Our conjecture is that, given current judicial norms and

What do judge-level data tell us about the factors shaping judicial incentives to resolve cases in Slovenia? Firstly, the evidence supports the life-cycle hypothesis of judicial performance. Judicial productivity measured by the total number of resolved cases initially increases and eventually (once a judge turns about 50) decreases with a judge's age. In contrast, gender and attained education are not robust predictors of judicial productivity. Given that the volume of resolved cases is deemed an important policy objective for Slovenian judiciary, the results suggest that policymakers could introduce additional incentive mechanisms for senior judges. Alternatively, policymakers could consider reducing the age of mandatory retirement.

Secondly, judicial productivity and judicial salaries are positively correlated, even when controlling for a range of judge-level characteristics, case type, and court fixed effects. While short of identifying the causal effect of judicial salaries on judicial productivity, this finding at least allows for the possibility that increasing judicial salaries in Slovenia would increase judicial productivity. Interestingly, studies for the U.S. and elsewhere do

not find a robust positive relationship between adjudicators' compensation and their productivity.

Thirdly, career concerns matter. In civil law jurisdictions, judges are civil servants with (largely) fixed salaries. Promotion therefore provides direct economic incentives. For instance, in the case of local Slovenian courts, judges who are up for promotion ceteris paribus tend to resolve nearly 20 percent more cases in the year preceding their promotion decision year than judges who are not up for promotion. This finding is suggestive of the possibility that judicial productivity could be increased through more consistent on-the-job monitoring.

The quantity-quality tradeoff in case resolution

In legal systems plagued by substantial backlogs of cases and long court delays, implementation of measures aimed at increasing the rate of case resolution understandably emerges as a high policy priority. However, can legal reform strive to increase judicial productivity without compromising the quality of judicial decisions? The concern is that if judges spend less time deliberating each case in order to increase their productivity, an increase in the volume of resolved cases will come at the expense of lowering the quality of judicial verdicts.

To assess whether there is a quantity-quality tradeoff in judicial decision-making in Slovenia, Dimitrova-Grajzl

et al. (2012b) examine if the more productive judges differ from their relatively less productive peers in terms of the quality of decision-making as proxied by the number of appealed cases and the number of cases overturned by a higher court.

The results, summarized in Table 1, show that an increase in judicial productivity does not lead to a drop in the quality of judicial decision-making in the case of district courts. District court judges that are on average more productive actually face fewer appeals and have fewer decisions overturned by a higher court than judges who are on average less productive. The opposite is true for local court judges. That is, in local courts there is evidence of a quantity-quality tradeoff. These results are robust to disaggregation of courts of a given type (district, local) to groups of judges specializing in the adjudication of specific legal matters (e.g., the relatively mundane enforcement cases versus the relatively complex criminal cases).

Why does the quantity-quality tradeoff exist in some (local) courts, but not in other (district) courts? Firstly, compared to local court judges, district court judges in Slovenia adjudicate cases for which the stakes for the involved parties are higher, and thus judicial decisions are likely under relatively closer scrutiny. District court judges may, therefore, rationally choose to act both (relatively) quickly and thoroughly. Conversely, judges in local courts, where the stakes for disputing parties are

Table 1

The quantity-quality tradeoff in judicial case resolution, tests of means						
Panel A: Appealed cases						
	Below-average productivity			Above-average productivity		
	No. obs.	Mean	Std. dev.	No. obs.	Mean	Std. dev.	*p*-value
Local courts	177	28.59	18.71	181	36.77	23.74	0.001
District courts	103	29.32	18.61	95	24.07	20.25	0.017
Panel B: Overturned cases						
	Below-average productivity			Above-average productivity		
	No. obs.	Mean	Std. dev.	No. obs.	Mean	Std. dev.	*p*-value
Local courts	177	6.88	5.88	181	7.62	7.67	0.785
District courts	103	10.02	8.33	95	7.78	8.42	0.012
Notes: The table reports results from t-tests of the difference in the mean number of appealed (Panel A) and overturned cases (Panel B) between the group of judges with below-average productivity and the group of judges with above-average productivity; see Dimitrova-Grajzl et al. (2012b) for details.						

Source: Based on data used in Dimitrova-Grajzl et al. (2012b).

lower, may rationally follow a model of adjudication that emphasizes speed of case resolution over depth. Secondly, compared to judges in local courts, district court judges in our sample possess greater experience on the bench. The absence of the quantity-quality tradeoff in district courts and the presence of the quantity-quality tradeoff in other courts may thus also be due to the observed differences in experience in case adjudication between district and local court judges.

Figure 2

Modes of civil case disposition

Proportion of all disposed civil cases

- Trial−based judgments
- Adjournments sine die
- Default judgments
- In−court settlements
- Decisions on lack of jurisdiction

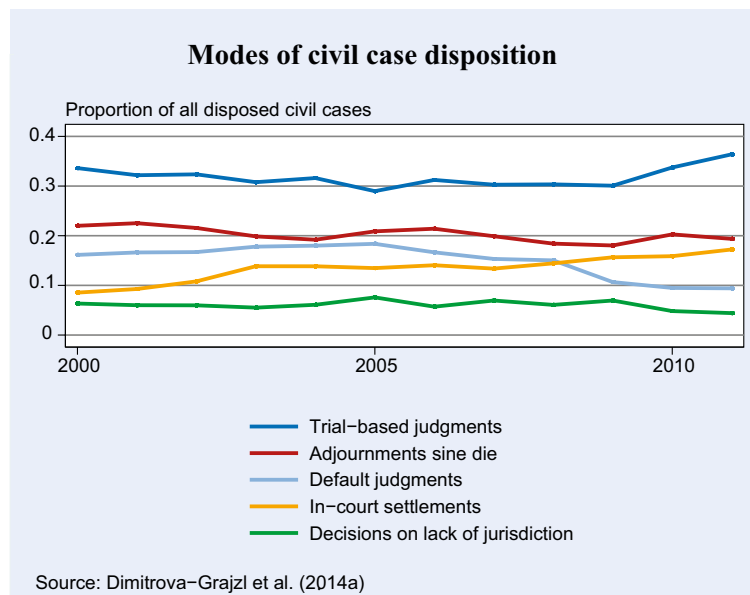Source: Dimitrova−Grajzl et al. (2014a)

Modes of case disposition

The resolution of disputes through trial is a fundamental function performed by courts. Yet not all cases filed at a court end up being resolved through trial. Based on data from U.S. courts (Kritzer 1987; Galanter 2004), for example, a very modest proportion of state and federal civil court cases (five percent or less according to some estimates) are resolved through trial. The majority of civil cases are settled through other, non-trial modes of disposition such as settlement, abandonment, or dismissal, thereby saving disputing parties litigation and other trial-related costs.

At the macro level, an understanding of the magnitude of changes in the incidence of specific court outcomes over time enhances the general predictability of the legal system, an important attribute of a country's institutions typically believed to be lacking in emerging-market countries. At the micro level, empirically grounded information on modes of civil case disposition is valuable because it serves as a basis for existing and potential dispute parties and lawyers to form expectations about the possible outcomes of legal disputes. Moreover, data on the structure of modes of civil case disposition sheds light on the role of judges in the legal process beyond their involvement in trials. Cases disposed via abandonment, dismissal or settlement, for instance, require significantly less judicial effort and resources than the relatively more time-consuming trials.

What are the basic patterns in modes of civil case disposition in Slovenia? Figure 2 presents the time series of the court-level mean of the proportion of civil cases dis-
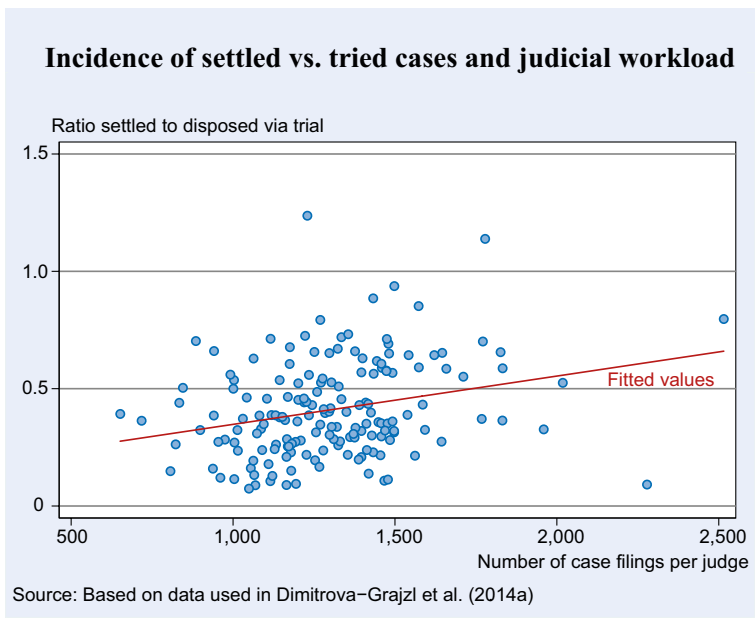
posed via each of the five most prevalent modes of civil case disposition. During the 2000–2011 period, there was a decrease in the mean proportion of civil cases disposed via default judgment, adjournment sine die, and decision on lack of jurisdiction. Characterizing the second decade after the start of post-socialist transition in Slovenia, these patterns may reflect an overall increase in the disputing parties' familiarity with the procedural aspects of court-based dispute resolution.

The average proportion of civil cases settled in-court increased steadily (from about eight percent in the year 2000 to above 17 percent in the year 2011). In-court settlement has, thus, become a more prevalent mode of civil case disposition both in absolute and in relative terms. One plausible explanation for this trend is a gradual increase in access to court-endorsed mediation, which facilitates in-court settlement.

In contrast, the mean proportion of civil cases resolved through trial-based judgment as the overall most frequent mode of civil case disposition does not exhibit a clear trend. The mean proportion of civil cases disposed through trial-based judgment decreased from a little less than 34 percent in the year 2000 to about 30 percent in the year 2009; after 2009, the proportion of trial-based judgments again increased, to above 36 percent in the year 2011. In Slovenian local courts, trial-based judgments hence represent a much more significant proportion of civil case dispositions than they do in the courts in the U.S. and other common-law jurisdictions.

Figure 3

Incidence of settled vs. tried cases and judicial workload

Ratio settled to disposed via trial

Fitted values

Number of case filings per judge

Source: Based on data used in Dimitrova–Grajzl et al. (2014a)

Moreover, in Slovenian local courts, trial-based judgments as a proportion of civil case dispositions do not appear to be decreasing, as observed in the U.S. courts in recent decades (Galanter 2004).

Incidence of trials versus settlements

Trials and settlements together account for a substantial proportion of all civil case dispositions and, at the same time, represent polar extremes among the modes of civil case disposition. Trials usually take longer and are associated with higher private and social costs of adjudication than settlements. Accordingly, trial-based case resolutions and settlements have attracted the most attention in the literature on this topic out of all the different modes of civil case disposition (Hadfield 2004; Eisenberg and Lanvers 2009; Priest and Klein 1984).

Do court resources, as proxied by the number of serving judges, and the demand for court services, as proxied by the number of all court case filings, influence the incidence of trials versus settlements, and if so how? Dimitrova-Grajzl et al. (2014) hypothesize that judicial modes of case disposition are biased against trial-based judgments (i.e. toward settlements) in courts with fewer serving judges or more total (civil and criminal) case filings, ceteris paribus. The argument is based on the well-known notion that judges ceteris paribus tend to prefer settlements since "settlements are the courts' automatic washer-dryers" (Langbein 2012, 560). At the same time,

the pecuniary and non-pecuniary costs incurred by the disputing parties are typically higher in the event of a trial than in the event of a settlement. Hence, holding all else (including judicial incentives) constant, filing parties should also be relatively more willing to settle a dispute when workload per judge at a court increases (and, thus, the estimated time to trial-based ruling is longer).

The pattern in Figure 3, depicting the sample of large local courts in Slovenia, is consistent with the above hypothesis, as is the evidence based on the use of more rigorous econometric methods aimed at addressing endogeneity concerns (see Dimitrova-Grajzl et al. 2014a). Court resources and the demand for court services may therefore affect not only total court output (i.e. the number of resolved cases), but also *how* cases are disposed of. Specifically, additional resources made available to resource starved courts can curb the extent to which an increase in the incidence of settlements is merely a socially sub-optimal response of disputing parties and judges to an increase in court caseload pressure. Because different modes of civil case disposition entail different social and private costs, the findings in Dimitrova-Grajzl et al. (2014a) point to a new set of considerations that need to be taken into account when contemplating the reform of a country's judicial system.

Conclusion

Well-functioning courts are necessary for large impersonal markets to flourish. The successful reform of a country's judicial system requires an empirically-grounded understanding of the performance of courts and the behavior of judges. Evidence based on Slovenian court-level data illuminates the impact that court resources and demand for court services exert on the volume of court output and the modes through which courts dispose cases. Judge-level evidence further highlights how judge demographics, compensation, and career concerns affect judicial productivity, as well as when judicial decision-making may be subject to a quantity-quality tradeoff.

In contrast to the analysis of firm-level data, scholars of post-socialist and developing countries have devoted hardly any effort to the collection and analysis of court data to date. In addition to the exploration of court-level and judge-level data from other emerging market economies, one further fruitful avenue for future research constitutes the study of court-based *case-level* data. Careful examination of the micro-level determinants of adjudicatory outcomes - such as when parties choose to settle rather than pursue trial and which party prevails if a case is tried (Dimitrova-Grajzl, Grajzl and Zajc 2014b) - promises to reveal further interesting insights into the behavior of judges and litigants in the post-socialist world and beyond.

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Liquidating Crime with Illiquidity: How Switching from Cash to Credit Can Stop Street Crime[1]

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Technological advances often have far-reaching and unintended consequences for society. In some cases these consequences can be negative. For example, the advent of fossil fuel technology accelerated industrial and scientific progress in the 20th century, but has had - and may continue to have - adverse consequences for the environment that could offset such benefits in the future (Houser and Mohan 2014). In other cases, the unintended consequences are positive. The social networking platform Twitter was originally designed to facilitate social interactions between people, but has played an unexpectedly significant role in advancing democratic events and institutions, including the election of President Obama (Greengard 2009) and the Arab Spring (Lotan et al. 2011, Hermida, Lewis and Zamith 2014). Critically, technological advances are moving forward at ever-faster rates, in some cases so fast that we are unable to devise policies to keep apace (Rycroft 2006). This is as true for crime as it is for any other societal phenomenon.

An important technologically-oriented change in recent years has been the transformation of our monetary and financial system from one that relied heavily on cash toone that now operates digitally and virtually, relying on a massive and ever-expanding, worldwide telecom-

munications infrastructure. The pace of change in our financial system has been rapid and closely mimics the exponential growth in technologies related to information processing (see, e.g., Kurzweil 2004, Jorgenson 2001). The primary aim of those pressing for increased digitization of the financial system has been to increase efficiency, expand financial opportunity, improve transactional security and maximize wealth. Despite large-scale events such as the Great Recession, this formula has worked well. Financial markets are larger, more efficient and more profitable than they have ever been (Evans and Hnatkovska 2014). At the same time, the implementation of these systems and their continued growth has had important consequences at the societal level.

Digitized financial transactions, like any web-based process, are subject to data storage-based record keeping, thereby creating *de facto* permanent records and making them almost universally traceable. Indeed, this attribute has been increasingly exploited by law enforcement agencies globally in their efforts to combat terrorism (Canhoto 2014, Brzoska 2014, Bures 2012, D'Souza 2011, Levi 2010), black market weapons trading (Edelbacher, Theil and Kratcoski 2012), human trafficking (Chuang 2006, Walker-Rodriguez and Hill 2011, Rankin and Kinsella 2011), tax evasion (Eccleston and Gray 2014, Mironov 2013, Unger and Can der Linde 2013), and the drug trade (Ott 2010). At the same time, there has also been concern regarding the extent to which traceable financial transactions impinge on the right to privacy and provide governments with excessive influence and control over citizens (Carlton 2012, Levi 2012). These positive and negative characteristics of the digital economy rest primarily on how it differs from one driven by cash.

As with digital transactions, cash presents advantages and disadvantages. Its primary attribute is that it remains the most liquid and anonymous transactional asset available, a boon for those wishing to engage in the most direct of exchanges or who wish to protect their identities. At the same time, this handicaps governments who wish to collect taxes or investigate crime, as well as consumers who may be victimized by certain kinds of cash-based fraud schemes. Cash is particularly well-suited to facilitating most illegal transactions for

these reasons. Criminals know this, eschewing digital financial exchanges that are traceable and therefore "investigatable". As a result, black and grey market economies worldwide are operated primarily with this medium (Schneider and Enste 2013, Naylor 2004).

For a variety of reasons, a significant amount of financial transactions in poor areas utilize cash. In the US, many of the poor are "unbanked" or "underbanked" (FDIC 2012, Rhine and Greene 2012). Chiefly, this is due to a lack of access to credit, locking poor consumers out of participation in the banking system. Because financial institutions are the primary means of accessing digital-based transactional capabilities (e.g., web-based banking, credit and debit-cards), the underprivileged have traditionally used cash in their day-to-day lives. Likewise, many businesses in poor neighborhoods have been slow to adopt credit- or debit card-based transactional technologies. In some cases, this may be in response to the underbanked customer-base they serve, while in others this has been a means of avoiding taxes (Schneider 2011, Morse, Karlinsky and Bankman 2009). These circumstances make community members in such neighborhoods both more likely to access black and grey markets and more vulnerable to predatory crime because cash is the primary target of acquisitive or "predatory" crimes (e.g., burglary, robbery, theft; see Rosenfeld and Messner 2013).

A great deal of the predatory activity that takes place in poor, urban neighborhoods is driven by the central role cash plays in the drug trade (Wright and Decker, 1994). The illegal nature of drugs makes their trade unsuitable for any form of electronic or online transactional system that creates a digital trail (including credit and debit cards, PayPal, Google Wallet, Square, etc). Few, if any, drug dealers are interested in exposing themselves to criminal investigations in this way, and most day-to-day street corner dealers lack the wherewithal to set up, establish, and operate the technological infrastructure required to accept digital transactions in any case. Moreover, many street drugs have pharmacological and pricing attributes that demand continuous, often rapid, acquisition and use. Crack, for example, is consumed by the average addict three to ten times per day (Mieczkowski 1990, Clemmey et al. 1997) and is priced at roughly USD 10–20 per use (Schifano and Corkery 2008, Desimone 2001). Similar consumption and pricing patterns emerge for methadone. Thus, bartering for drugs as an alternative to cash also makes little sense, as a would-be user would have to incessantly obtain items that a drug dealer would want in order to satisfy the daily, even hourly, demands of their habit.

More importantly, the drug trade is embedded within a larger socio-cultural context of the streets particularly well suited to – and in most cases predicated on – cash-based predatory crime. Previous research has identified a core group of street offenders responsible for driving much of the day-to-day predatory crime in the streets (see Wright and Decker 1994, 1997). These individuals lead exceedingly hedonistic lives, and are unencumbered by the day-to-day considerations of mainstream civil society. They generally hold little regard for long-term planning, are impulsive, inured to violence, and eschew the mores of middle class culture (such as legitimate work, seeking education, paying taxes, etc.) (see Brezina, Tekin and Topalli 2009; Topalli 2005). The hallmark of this lifestyle is its reliance on cash. These offenders actively engage in a "party-as-life" street culture (Shover and Honaker 1996) focused on illegal pursuits such as gambling, the sex trade, and especially drugs and alcohol. Their constant participation in these activities requires constant infusions of cash, as this is the only transactional medium that will allow offenders to pay for them without fear of detection and because the regularity of such pursuits requires transactional liquidity. However, the ease with which cash serves as a transactional medium for illegal pursuits also increases the likelihood that offenders will quickly exhaust their resources and become desperate for more cash (see Topalli and Wright 2014). This, in turn, drives street criminals to engage in predatory behavior to finance their hectic lifestyles. The resulting acquisition of cash then fuels the repetition of this cycle over time, as illustrated in Figure 1 (see Wright and Decker 1994). The primary targets of such crimes are people known to carry cash in the first place. In some cases this includes individuals who are themselves offenders (such as drug dealers; see Jacobs, Topalli and Wright 2000, Topalli, Wright and Fornango 2002). Often though, the targets of such predation have been neighborhood residents. As mentioned above, such individuals are unbanked or underbanked, meaning that they have typically conducted most of their financial transactions (such as groceries or rent) using cash. But what has been the source of cash among the poor?

In the United States, a significant source originates from "welfare" benefits (referred to as Temporary Assistance to Needy Families, or TANF). Historically, TANF payments were mailed as paper checks to beneficiaries on a monthly basis. Consequently, large amounts of cash

Figure 1

Etiological cycle of street crime
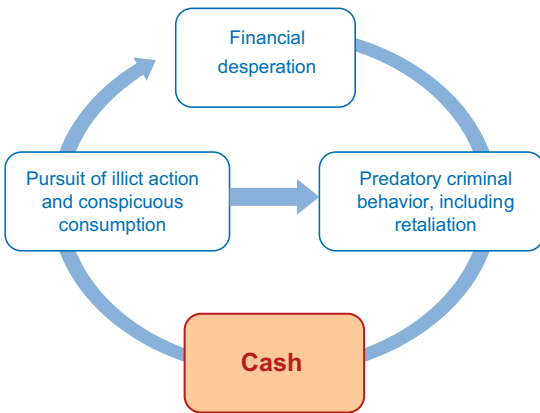
Source: Wright et al. (2014).

were available to welfare recipients at one point in time each month (Ford and Beveridge 2004)[6]. Because so many recipients lack access to banks, they typically relied on a network of locally owned and operated check cashing establishments common to poor neighborhoods in the US. These establishments and the monthly schedule of payments were well known to predatory offenders. Consequently, neighborhood residents who cashed their benefits represented vulnerable targets of opportunity for robbers, burglars, and thieves seeking cash to bankroll their pursuit of illicit action.

Over a roughly 15–year span stretching from the Reagan to Clinton administrations, the US Federal government made a number of significant legislatively backed policy changes vis-à-vis benefits payments, the most important of which was the introduction of an electronic benefits transfer (EBT) system whereby check-based welfare payments were to be replaced by debit-cards. The primary aim of this system change was to reduce the financial impact of benefits transfer to the government by eliminating printing and mailing costs, reducing welfare fraud, speeding up transfers and improving record keeping. The process began in the 1980s with a number of EBT demonstration programs and ended in the 1990s with the Personal Responsibility and Work Opportunity Reconciliation Act. Welfare reform legislation enacted in 1996 required every state in the

US to develop EBT systems to program benefits electronically by 2002. In a recent paper (Wright et al. 2014), we surmised that the variable introduction of the EBT system would effectively reduce the amount of cash circulating on the streets among those most often targeted by predatory offenders. The end result of such a drain on the flow of cash in poor neighborhoods would be a disruption of the predatory criminal cycle described above, resulting in a drop in predatory acquisitive crimes post EBT implementation.

Our research team tested this hypothesis by measuring the extent to which moving assistance payments to the poor from a check-based system to one that was digital (via EBT cards) would have just this effect. In order to test our hypothesis, we focused on the state of Missouri, which has implemented its EBT program in eight phases in different sets of localities (counties) between June 1997 and May 1998. With the introduction of the EBT program, welfare recipients residing in each of these localities – previously forced to cash their benefits checks at private check cashing establishments – were now able to expend their funds via the EBT system and no longer had to carry their financial resources with them. This removed a significant source of money that fueled criminal predation and thereby reduced opportunities for victimization. The decreasing supply of cash was expected to reduce opportunities for criminal predation, as reflected in typical crime statistics.

More specifically, we assembled county level monthly data on various types of crime from the state of Missouri between 1990 and 2011, including total crime, burglary, robbery, larceny, and motor vehicle theft. These data are drawn from the Uniform Crime Reporting (UCR) Program of the Federal Bureau of Investigation (FBI), which represents "a nationwide, cooperative statistical effort of nearly 18,000 city, university and college, county, state, tribal, and federal law enforcement agencies voluntarily reporting data on crimes brought to their attention." Importantly, because various sets of counties initiated the implementation of the EBT program in different months between 1997 and 1998, this variation across space and time gave us the leverage to employ a difference-in-difference method, which is critical for identifying the causal effect of the program. The difference-in-difference method basically produces the difference in average crime rates in the jurisdictions with an EBT program before and after the implementation date, net of the difference in average crime rates in those counties without an EBT program. To the extent that there is no other plausible mechanism through

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[6] In addition, food assistance benefits, now referred to as Supplemental Nutrition Assistance Program (SNAP) benefits, were previously distributed as "food stamps". Prior to their inclusion in the EBT system, these benefits were relatively fungible in that they could be exchanged between recipients illegally or traded in at vendors for cash. A key reason for establishing EBT was to prevent such illegal trafficking (see USDA, 2003), thus removing an additional yet indirect source of cash from the streets.

which EBT implementation could cause an independent effect on crime, any association obtained between EBT implementation and crime could then be attributed to the removal of cash. Given the count nature of the crime data, we estimated our difference-in-difference specification using a fixed effects negative binomial regression.

Our results indicated that the EBT program implementation caused a significant decrease in the overall crime rate and the specific offenses of burglary, assault and larceny in Missouri. According to our point estimates, the decline in the overall crime rate in Missouri caused by the EBT program was 9.8 percent, while reductions in burglary, assault, and larceny totaled 12.5 percent, 7.9 percent, and 9.6 percent, respectively. We also found evidence suggesting the EBT program also resulted in less robbery. It is important to note that we tested and rejected the alternative explanation that the implementation of the EBT program simply had a displacement effect, i.e., a situation whereby crime decreased in counties with an EBT program in effect, while increasing in other counties.

To gain a broader perspective on our findings, we also calculated the total disbursements made under the welfare programs in Missouri in 1997 in the treatment counties, which totaled USD 671.2 million. This figure can be interpreted as the maximum amount of cash that needs to be removed from circulation in order to produce a decrease of 9.8 percent in the total crime rate.

We also examined arrests as an additional outcome and found that EBT also had a negative impact on arrests, especially those associated with non-drug offenses by a magnitude of 9.2 percent. This finding is reassuring for our crime results because, if our hypothesis for the effect of EBT program implementation on crime is correct, then we should expect fewer crimes to be committed, which, in turn, should result in fewer arrests.

There is significant evidence that the United States economy is moving away from cash as a transactional medium. The proportion of financial transactions utilizing cash has steadily decreased, largely due to the increased use of credit cards, which entered the United States market in the 1950s. In the 1970s, ATM and debit cards were introduced to the US market. More recently, there has been a more pervasive increase in mobile financial transactions (see Erling 2013). Furthermore, over three-quarters of all non-cash payments in the United States in 2009 were made electronically, a nine percent increase from 2006 (Federal Reserve System

2011).[7] Actually, cash transactions in the United States have steadily declined over a much longer span of time. Eighty percent of financial transactions were made using cash fifty years ago, compared to roughly fifty percent today.

There is no reason to believe that cash transactions will not continue to decline in the future as the proliferation of online banking and commerce platforms continues to grow. Since 1990 debit transactions have risen 27–fold, while cash volume has grown at an annual rate of only four percent (see Littman and Oliver 2012). It is also important to note that checks were the primary means of benefits transfer to the poor, but their overall use declined by over 50 percent over that same time period. This move away from cash is, of course, not unique to the United States; and has been even more strongly embraced by other countries. Sweden (Tomlinson 2012) and Israel (Shamah 2014) for example, have instituted policy-driven legislation that makes cash less advantageous to use, and encourages electronic monetary transactions (primarily to combat tax evasion, but also for the purposes of curtailing other forms of cash-based crime). The results of Wright et al. (2014) suggest that as the world moves further and further away from cash, cash-based crimes – primarily those that are acquisitive and predatory and that occur on the streets – will continue to drop.

This raises an important policy proposition, namely the purposeful and universal banning of cash as legal tender and its replacement with a networked digital transactional system of monetary transfer, with a view to eliminating cash-reliant acquisitive crimes like robbery, larceny, and burglary. Because the world economy seems to be moving inevitably toward a universally cashless system, the policy question has more to do with whether governments (in concert with financial institutions) should accelerate this process or allow it to take its natural course.

Taking this into account, it is important to note that the shift from check-based to EBT-based transfer of benefits to the poor was not designed specifically to combat these types of crime. It was for the purposes of streamlining the benefits transfer process, improving accounting, and curtailing fraud. It is also important to note that the shift was made long after the US and most of the remaining industrialized world began to adopt and integrate electronic monetary transfer protocols into their financial systems and institutions. Thus, the role

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[7] In the US, electronic payments account for over 75 percent of all noncash payments. Meanwhile, check payments now represent less than 25 percent (Federal Reserve System, 2011).

played by EBT implementation on crime in the US is only a small part of the overall story of how cashless economies will eventually affect crime. To some extent this has to do with the target populations of acquisitive and predatory crime. Middle and upper class citizens in the US who carried a certain amount of cash with them back in the 1970s were not significantly more at risk of victimization than they are today, even though they are far less likely to carry cash today. That is because they live in environments where the threat of interpersonal crime has always typically been low. This is not the case for residents of poor neighborhoods where predatory crime has been a constant threat. The same individual carrying cash in such neighborhoods during the 1970s was significantly more at risk of victimization than they would be today if they were now utilizing the EBT system to receive their benefits. Because poor urban individuals are the primary source of victims for such crimes, it is no surprise that the implementation of EBT among this population correlates so well with the widely acknowledged drop in the US crime rate, which began in the 1990s and continues through to today (Blumstein and Wallman 2006).

As such, the transition to a cashless environment may be made on a community-by-community basis. We know from Wright et al. (2014) that the variable transition of EBT across counties in Missouri did not evidence any shifts of crime from counties that adopted EBT to those that had not yet done so. Assuming geographical variations in crime distribution follow similar patterns at more local municipal levels (say at the city, town, or village level), it could be assumed that local communities could adopt cashless ordinances based on their current levels of acquisitive and predatory crime. The benefits of such a move would be the reduction not only of acquisitive and street crimes, but also of cash-based fraud schemes and tax evasion by merchants themselves. In addition, since many acquisitive and street crimes occur between offenders, a reduction in such crimes would also prevent offender-on-offender retaliatory violence (see Jacobs, Topalli and Wright 2000, Topalli, Wright and Fornango 2002), which has been demonstrated to be recursive and contagious (Wright and Topalli 2014).

There are some unintended consequences that may or may not be viewed as negative or positive depending on the constituency evaluating such outcomes. For example, a fully cashless economy (or one localized to a particular region or city) would substantially impact undocumented (sometimes referred to as "illegal") immigration. Undocumented laborers enter the country to find work that can be paid for in cash if the employer wishes to avoid running afoul of local or national labor, employment, and tax laws. Eliminating cash makes such schemes almost impossible to execute. While some may cheer on such a development, the fact remains that many employers, particularly in agriculture, rely on such workers to sustain their enterprises (and maintain affordable food pricing). At the same time, this development would make it less likely that undocumented workers would be exploited or abused.

In neighborhoods where cash is still heavily used and where access to banking and other forms of digital transactions are scarce, the move to banning cash would have a severe impact on black and grey markets, as well as on a variety of quasi-legitimate businesses that serve to sustain such communities (unlicensed daycare centers, day workers, so-called shade tree mechanics, etc). As is the case with undocumented immigrants, this is a double-edged sword. On the one hand, the elimination of such quasi-legal or outright illegal operations would reduce the chances of abuse or harm (for example in the case of an unlicensed daycare facility whose workers are unsuitable for the care of children). On the other hand, there is no doubt that these kinds of employment and business activities sustain communities where few, if any, legitimate opportunities for making money or obtaining such services actually exist. Thus, the challenge of executing a cashless policy in the service of reducing crime is to ensure that the implementation does not replace the bane of criminal victimization that poor people experience with economic isolation. As economies grow and change, the critical question will not be whether crime goes away: The evidence suggests that street crime will, but it is likely to be replaced with internet- or online-based crime. Rather, the key issue has to do with whether communities that adopt such strategies also have in place procedures for ensuring that those most affected by the removal from cash will have access to sustainable economic growth and financial inclusion, and do not fall behind.

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Public Service Broadcasting in an International Comparison

The way public service broadcasters (PSBs) are governed and funded differs significantly between various countries of the world. There are differences in the type of funding provided, the magnitude of public funding and its per-capita figure, as well as the extent to which PSBs succeed in attracting viewers. Table 1 offers an overview of some indicators that illustrate these issues.

The column *Market share of the national PSB* indicates how the PSB performs in national television markets. The market share in the various countries ranges from 3.3 percent in Turkey (2010) to 65.9 percent in Denmark (2012). In three further countries, namely Iceland, New Zealand and the UK, the PSB's market share is over 50 percent. The category *Main source of funding of the PSB* describes whether the PSB is mainly funded by public funds originating from general taxation, by a license fee that is paid by the citizens specifically for PSB services, or whether commercial revenues respectively revenues from advertising are the main source of revenue. In 14 out of the 31 countries included in this sample, the main source of funding is a license fee paid by the citizens. This fee ranges from EUR 27 per year in Portugal to EUR 384 in Switzerland (2012). The way fees are raised also differs fairly substantially between the countries. In Turkey, citizens pay a two percent mark-up on their electricity bill. In Spain, part of the revenue tax that private broadcasters and telecommunication operators pay is used for PSB funding. In twelve countries, funding is derived from general taxation. In two cases (Poland and New Zealand), commercial revenues respectively advertising revenues are the PSB's main source of income. In the United States, the biggest share is financed by private donations. Looking at *Total public funding per year*, Germany (EUR 7,275 million) ranks top, followed by Japan (EUR 6,413 million) and the United Kingdom (EUR 4,653 million). *Per-capita public funding per year* is only about EUR 3 in the United States compared to EUR 136 in Norway. The indicator *Number of national viewers per EUR million of public funding* can be understood as a combination of the two indicators *Per-capita public funding per year* and *Market share of the national PSB*. Here New Zealand (where the PSB is mainly funded by commercial revenues respectively advertising revenues) by far outnumbers the other countries with about 164,000 national viewers per EUR million of public funding. Italy boasts the second highest figure of around 15,400 viewers. With respect to this indicator Canada ranks bottom of the list with about 3,300 viewers per EUR million of public funding.

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Table 1

Public Service Broadcasting: an international comparison						
Country	Market share [%] of the national PSB	Main source of funding of the PSB[k]	Total public funding per year (EUR million, 2011)[n]	License fee per year (EUR, 2012)[k]	Per-capita public funding per year (EUR, 2011)[n]	Number of national viewers per EUR million of public funding (2009)[o]
Austria	35.3[i(2012)]	license fee	548	194	70	6,371
Belgium (wal / fla)	20.9[i(2012)] / 31.6[i(2012)]	taxes/taxes	513	100/ ---	51	6,726
Bulgaria	8.5[i(2012)]	taxes				
Czech Republic	29.3[i(2012)]	license fee		86		
Denmark	65.9[i(2012)]	license fee	492	324	88	4,262
Estonia	19.0[i(2012)]	taxes				
Finland	42.0[i(2012)]	taxes	415	252	82	6,852
France	24.6[i(2012)]	license fee	3,272	125	52	8,537
Germany	42.8[a(2012)]	license fee	7,275	216	94	4,143
Hungary	13.3[i(2012)]	taxes				
Ireland	29.6[i(2012)]	license fee	184	160	40	7,286
Italy	43.3[l(2003)]	license fee	1,708	112	29	15,371
Latvia	13.3[i(2012)]	taxes				
Lithuania	9.9[i(2012)]	taxes				
Netherlands	23.7[m(2013)]	taxes	558[c(2007)]		34[c(2007)]	
Poland	32.4[i(2012)]	advertising		61		
Portugal	17.3[i(2012)]	license fee		27		
Spain	14.7[i(2012)]	revenue tax on private broadcasters and telecommunication operators[g]	2,335		51	6,090
Sweden	31.0[i(2012)]	license fee	804	239	88	8,768
United Kingdom	53.7[p(2011)]	license fee	4,653	179	73	7,429
Iceland	56.3[i(2012)]	taxes				
Norway	41.0[i(2012)]	license fee	641	345	136	5,092
Switzerland	30.0[s(2013)]	license fee	995	384	124	4,296
Turkey	3.3[q(2010)]	2 % mark-up on electricity bill				
Australia	18.4[r(2010)]	taxes[b]	900		40	6,311
Canada	5.5[f(2012)]	taxes[f]	861		25	3,342
Israel	10.0[t(2006)]	license fee[t]		116[e]		
Japan	20.0[u(2010)]	license fee[u]	6,413	149[u]	50	5,750
New Zealand	62.0[h(2013)]	advertising[b]	69		16	163,793
United States		donations[g]	792		3	6,617[(2008)]
Russian Federation	32.1[i(2011)]	taxes[d]				

Source: The author.

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Road User Charging in the European Union

Overview

Road user charging is now widely implemented throughout the European Union. The charging schemes, however, vary considerably between EU member states. This article provides a brief overview of the different road user charging schemes and their implementation for heavy goods vehicles and for light vehicles.[1]

Policy background

Road user charging for heavy goods vehicles is regulated by the European Union through *Directive 1999/62/EC* (also known as the *Eurovignette Directive*). It was introduced to create a road charging regime across the EU that allows heavy goods vehicles to operate across borders (AECOM 2014). The Directive authorises (but does not oblige) EU member states to levy time-based or distance-based road charges for vehicles over 12 t. *Directive 2006/38* extended the scope of road user charging to cover commercial vehicles over 3.5 t.[2] For light private vehicles, by contrast, no such Directive exists. The reason for this is that the movement of goods is directly linked with the EU´s core purpose and principles: free trade and the free movement of goods among EU member states. Hence the *Eurovignette Directive* ensures that Member States do not use road user charges on heavy goods vehicles as a way of penalising competition from other member states (Booz & Company 2012). This does not apply to private vehicles, meaning that the principle of subsidiarity entitles member states to install their own charging / taxation policies.[3]

Methods of road user charging

Broadly, three methods are adopted by EU member states to charge road users:
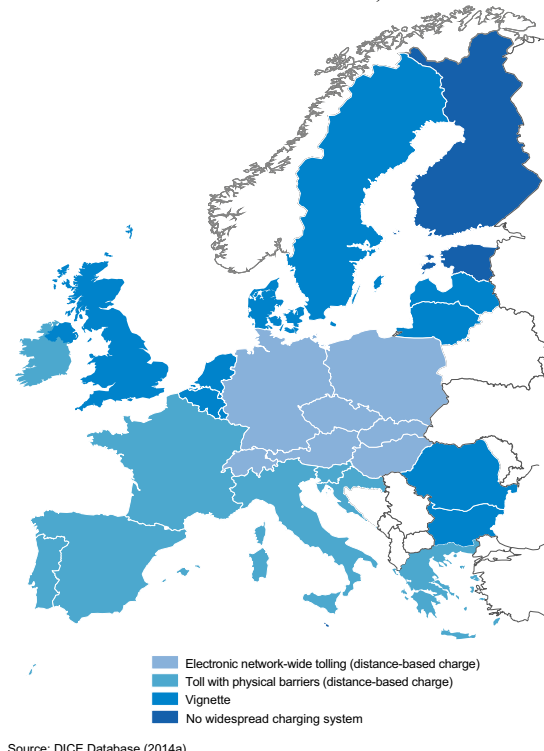
Figure 1

Charging of heavy goods vehicles in the EU and Switzerland, 2014

- Electronic network-wide tolling (distance-based charge)
- Toll with physical barriers (distance-based charge)
- Vignette
- No widespread charging system

Source: DICE Database (2014a).

1. **Concession motorway tolls** are distance-based charges and typically use "toll plazas" (manned/unmanned barriers), although increasingly these may have lanes that allow electronic charging without vehicles needing to stop (Ricardo-Aea 2014).
2. **Vignettes** are time-based charges. The purchase of a vignette gives the user the right to use the infrastructure for a given period of time (i.e. a week, a month or a year).
3. **Network-wide electronic tolls** allow access to the whole network of charged roads, and have electronic charging systems that are common across the network.

Heavy goods vehicles

Figure 1 shows the geographical coverage of road user charging systems for heavy goods vehicles in the European Union and Switzerland. Concession motorway tolls are in place in Croatia, Ireland, France, Spain, Italy, Slovenia and Greece and Portugal.[4] Eleven countries use the vignette (Bulgaria, Belgium, Denmark,

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[1] Heavy goods vehicles > 3.5 t, light vehicles < 3.5 t (i.e. passenger cars, motorcycles and light commercial vehicles).
[2] This requirement became mandatory from 2012, except in circumstances that would create adverse effects on traffic flow or externalities, or if the administrative costs would amount to over 30 percent of the additional revenue (Ricardo-Aea 2014).
[3] The core principle of non-discrimination applies regardless and EU member states are still required to be compliant with the EU Treaty and EU law in their application of road user charging systems (Booz & Company 2012).

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[4] Other countries have manual tolling on a small number of roads, the scale is not significant.

Hungary, Latvia, Luxembourg, Lithuania, the Netherlands, Romania, Sweden and the UK).[5] Electronic network-wide tolling systems are in place in Germany, Austria, the Czech Republic, Hungary, Slovakia, Poland and Switzerland. Only a handful of countries have no widespread charging system in place, namely Finland, Estonia, Malta and Cyprus.

The *Eurovignette* countries,[6] Germany and the UK restrict their charging to heavy goods vehicles above 12 t. All other countries charge from 3.5 t. Most countries also include buses in their charging policy. All three schemes typically differ in price according to the vehicle's Euro emission class and/or number of axles. Thus, actual prices charged vary considerably, depending on the vehicle type, and are not covered in this short article.[7]

Figure 2 shows the development of road user charging methods used by EU member states over time. There appears to be a trend towards the use of electronic network-wide tolling. Austria, Germany, the Czech Republic, Slovakia, Poland, Hungary and Belgium have started with the vignette and have now moved (or have plans to do so) to the electronic system. France is the only country with plans to move to electronic network-wide tolls that did not initially start with a vignette.

Electronic tolling schemes, however, operate on a national level and the technologies used are not necessarily compatible across borders. *Directive 2004/52/EC* and the related *Commission Decision 2009/750/EC* (which defines the European Electronic Toll Service EETS) aim to ensure the interoperability of electronic road tolling systems across the European Union. There have been delays in implementing EETS, but some effort has been made (mainly bilateral interoperability agreements to date) to make systems interoperable. Currently, interoperable systems exist between France and Norway (with the potential to include Spain, Austria and Slovenia); Germany and Austria; Norway, Sweden and Denmark (see Ricardo-Aea 2014 for more details).

Light private vehicles

Figure 3 shows the countries with road infrastructure charges for light private vehicles. In Croatia, France, Greece, Ireland, Italy, Poland, Portugal, and Spain a toll is charged for the use of a specific road section. In addition, most countries charge for the use of

Figure 2

Development of infrastructure charging systems for heavy goods vehicles in the EU and Switzerland 1995–2016
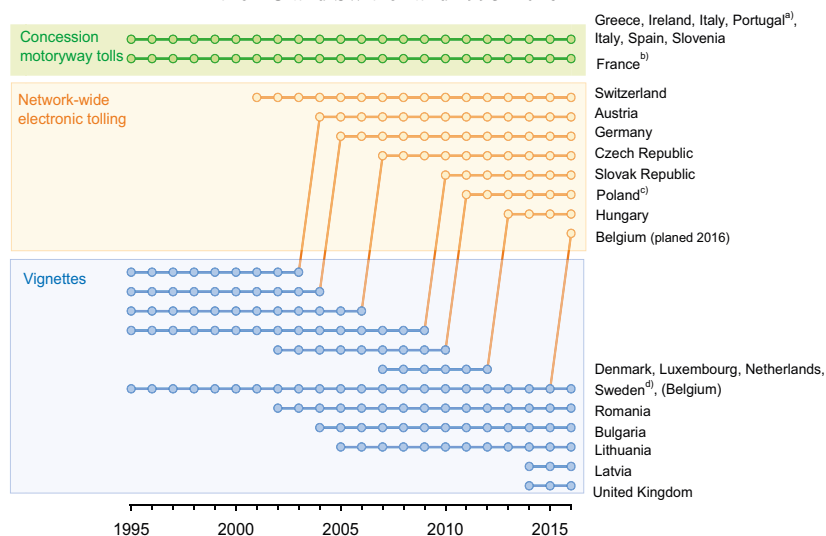
Notes:

a) Portugal is a hybrid case, there is no nationwide network tolling across all major highways, but many of its major motorways are tolled on the fully electronic *Via Verde* system.

b) France plans to apply charges to existing untolled state owned motorways, so it will retain its present system of tolls with physical barriers on motorway concessions. The introduction in France has been further delayed, and no date has yet been announced..

c) Poland has tolls with physical barriers on part of the network but is classified as having electronic network-wide tolling in place.

d) Sweden joined the Eurovignette in 1998.

Source: DICE Database (2014d).

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[5] The UK introduced a vignette on 1 April 2014, Latvia on 1 July 2014.
[6] The Eurovignette system was the first harmonised agreement in the EU (vignette, since 2008 electronic). It was set up in 1995 by Belgium, Denmark, Luxembourg, the Netherlands, Germany and Sweden. Germany left the Eurovignette in 2003 to set up an electronic toll, Belgium plans to move to an electronic system.
[7] An overview of road user charging under the *Eurovignette Directive* can be accessed at DICE Database (2014a). For heavy goods vehicles charges see DICE Database (2014e).

some tunnels or bridges.[8] Seven EU countries have vignette systems for light private vehicles: Austria, Bulgaria, Czech Republic, Hungary, Romania, Slovak Republic and Slovenia. Vignettes are also compulsory in Switzerland. Germany is planning to introduce a vignette for light vehicles in 2016.

There are two types of vignettes in operation: sticker/paper vignettes and electronic vignettes. The latter are only currently in use in Hungary and Romania. In Romania and Bulgaria, a vignette is required for most of the national road network, while in the remaining countries a vignette is needed to use motorways and major highways (Booz & Company 2012).

In each of the vignette countries (except Switzerland) vignettes are available on a weekly basis (between seven and ten days), per month[9] or annually. The price for a weekly ticket ranges from EUR three (Romania) to EUR 15 (Slovenia). Monthly prices range from EUR seven (Romania) to EUR 30 (Slovenia). The annual vignette costs between EUR 28 (Romania) and EUR 154 in Hungary. In Switzerland, the only option available is a full year (14 months) for the price of EUR 33 (see Table 1).

Short-term users pay much higher prices on a per day basis than long-term users: if the price for a vignette (weekly/monthly/annually) is divided by the number of days for which it provides access to a network, the ratio between the longest and shortest term product varies considerably between countries (Booz & Company 2012). Table 2 shows the average daily prices for short-term versus long-term vignettes. On a per day basis, the price for a short-term vignette ranges between 3.8 (Austria) and 8.2 (Slovenia) times more than the price for an annual vignette.

Conclusion

Across the European Union, road user charging (both for heavy goods vehicles and light private vehicles) is now widely applied, but different infrastructure charging systems are in place. This reflects the different national political priorities that have – in combination with the respective institutional frameworks – developed over time. Subsequent amendments to the *Eurovignette Directive* allowed a greater variation in tolls to reflect

Figure 3

Charging of light private vehicles in the EU and Switzerland, 2014

Toll with physical barriers (distance-based charge)
Vignette
No widespread charging system
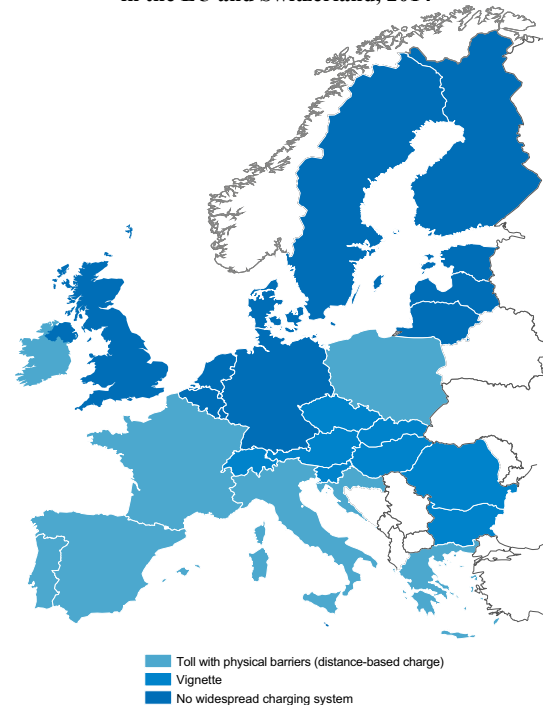
Source: DICE Database (2014b).

not only the costs of infrastructure construction and maintenance, but also external costs, caused by pollution, noise and congestion. It is up to each member state to choose how to implement the *Eurovignette Directive*. Consequently, individual countries have designed approaches that are most acceptable to their stakeholders, or legacy issues, such as concession contracts dating from before the *Eurovignette Directive* was in place. This has also resulted in different approaches to system technologies, so that today electronic tolling – although increasingly applied – is not necessarily compatible between countries. The lack of interoperability between charging systems creates greater costs for users, particularly for international hauliers that often have to equip their vehicles with multiple on-board units for different systems (Ricardo-Aea 2014). In the light of growing international transport, it now seems important to focus more on the interoperability between road user charging systems, as set out in the European Commissions´ European Electronic Toll Service (EETS).

Sabine Rumscheidt

Table 1

Charges for vignettes, vehicles < 3.5 t in the EU and Switzerland (in EUR), 2014			
	Week	Month	Year
Austria [a]	8.50	24.80	82.70
Bulgaria [b]	5.00	13.00	34.00
Czech Republic [a]	14.00	20.00	64.00
Hungary [a]	10.60	17.00	154.00
Slovakia [a]	10.00	14.00	50.00
Slovenia [b]	15.00	30.00	95.00
Romania [b]	3.00	7.00	28.00
Switzerland			33.00
[a] Week = 10 days [b] Week = 7 days			

Source: DICE Database (2014c).

Table 2

Average daily prices for short-term versus long-term vignettes, 2014			
	Short-term (week)	Long-term (year)	Ratio short-term/ long-term
Austria	0.85	0.23	3.75
Bulgaria	0.71	0.09	7.67
Czech Republic	1.40	0.18	7.98
Hungary	1.06	0.42	2.51
Romania	0.43	0.08	5.59
Slovakia	1.00	0.14	7.30
Slovenia	2.14	0.26	8.23

Source: DICE Database (2014c).

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IMPROVING QUALITY IN LONG-TERM CARE

Introduction

Population ageing is an issue affecting policymakers in industrialised countries all over the world. On average across OECD countries, there has been a large increase in the share of the elderly population in recent decades due to rising life expectancy and declining fertility rates. This development is projected to continue over the next decades. The rise in the share of the population aged 80+ years is especially large. Figure 1 illustrates the percentage of the population aged 80+ years projected for the year 2050 compared to the percentage in 2010.

It becomes obvious from Figure 1 that the share of the population aged 80+ years will more than double in many countries (Italy, Greece and the United Kingdom, for example) by 2050 versus 2010; and in some countries (e.g. Korea, New Zealand and Poland), this percentage will even more than triple. On average across OECD countries, the share is projected to increase from four percent in 2010 to ten percent in 2050. This demographic development poses many challenges to long-term care systems. Of course, an increasing share of the popula-

tion aged 80+ years does not necessarily imply an additional burden to long-term care systems, since the need for long-term care services depends on the health status of the elderly population. However, even according to an optimistic projection scenario – the so-called "cost-containment scenario", long-term care expenditure as a share of GDP is projected to increase in the future. Figure 2 illustrates projected spending on long-term care as a percentage of GDP for the year 2060.

Figure 2 shows that on average across OECD countries, long-term care spending as a share of GDP will be twice as high in 2060 compared to the average value for the years 2006 to 2010 (1.6 percent compared to 0.8 percent). In some countries (for example, Turkey, Mexico and the Slovak Republic), the increase is even projected to be far more significant. Hence, it becomes evident that the increase in costs arising from population ageing will be considerable, even under optimistic assumptions.

Regulation of long-term care systems

In view of the growing need for long-term care services in the decades ahead, which is associated with significantly higher costs than in the past, improving the quality of long-term care services is becoming increasingly

Figure 1

Share of the population aged 80 years and over, in the years 2010 and 2050

Source: OECD (2013).

Figure 2

Projections of long-term care spending as a percentage of GDP for the year 2060
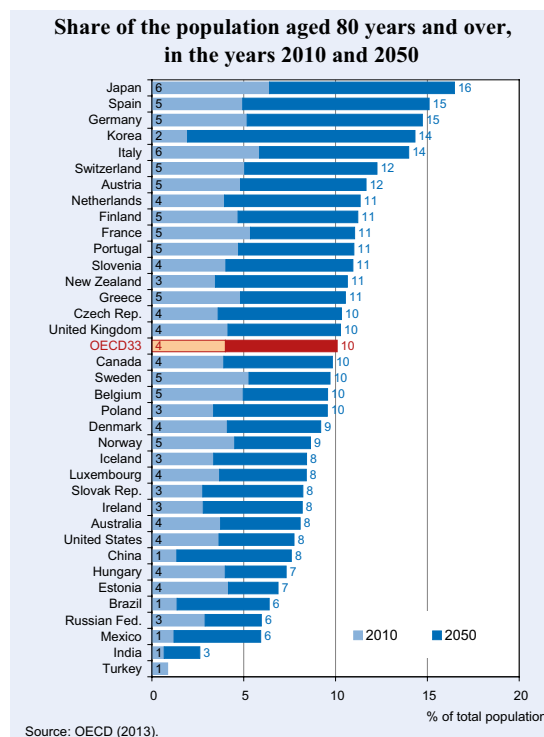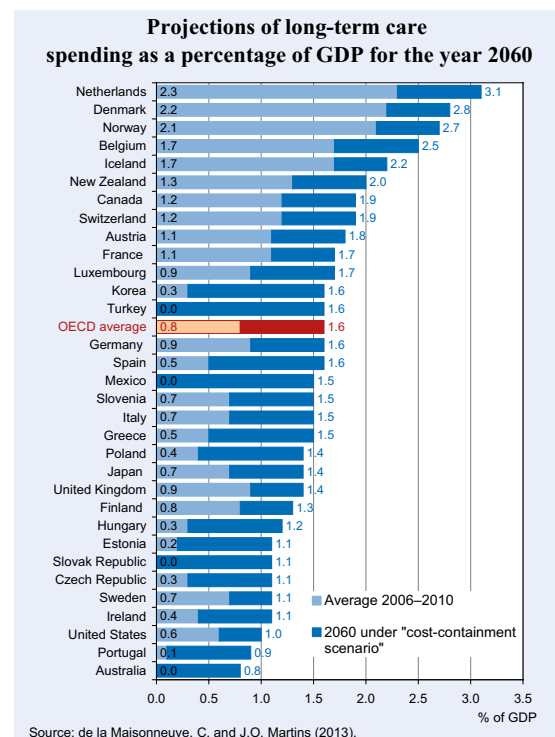
Source: de la Maisonneuve, C. and J.O. Martins (2013).

important (see OECD/European Commission 2013). In order to ensure that long-term care services offer a certain level of quality, long-term care systems are regulated. In all OECD countries, the central government determines the principles of regulation of long-term care systems. The three main objectives of regulation are to guide care providers on how to improve quality, to inform people needing long-term care services about the provision of certain care services and to provide information to regulators so that they can help to identify gaps. In many countries, decentralised bodies are responsible for the implementation of quality control.[1]

The regulation of long-term care systems differs across countries. In general, nearly all OECD countries require long-term care institutions to be registered. This registration is conditional to the institution fulfilling certain minimum requirements. In addition, over two thirds of OECD countries require further quality standards for institutions. This kind of regulation is denoted by the term "accreditation"; and the main characteristic of accreditation is an evaluation process involving both an internal and an external review. During the internal review, care providers and institutions document their long-term care services, whereas during the external review, a governmental authority evaluates providers and institutions. In many countries (for example, France, Germany and Spain), accreditation is a precondition to accessing public funding.[2]

There are some common quality standards across OECD countries. One quality standard is a minimum ratio of long-term care workers to long-term care recipients. This ratio is used as a proxy for the safety and mobility of residents of long-term care institutions. There are also requirements that living environments have to fulfil in order to prevent accidents. Apart from measures that must be taken to ensure safety and mobility, further aspects have recently been taken into account in some countries. In the Netherlands, the United Kingdom and the United States, for example, the quality of life of residents and human dignity have been included; while in Ireland and the United States, individualised care planning processes and reporting systems for complaints have been added to the list of quality standards. In general, there is less regulation of home care and community-based care services than of long-term care institutions. There are, however, differences across countries. For example, in the Netherlands, care that is provided

outside of institutions is less strictly regulated than institutional care; whereas in Spain, accreditation is compulsory for any centre providing care services, which implies stricter requirements. The general purpose of regulating home and community care is to guarantee that the living environment is adapted to the needs of care recipients.

Inspections of care institutions and incentive schemes for care providers

In order to ensure that requirements with respect to quality standards in the long-term care system are met, inspections are carried out, which include paper-based inspections and on-site visits. In some countries, structured interviews with residents of long-term care institutions, family members and staff are required. The questions that are asked concern various aspects ranging from structural issues and satisfaction of care recipients to safeguarding resident rights. In many countries, inspections take place annually (e.g. Germany, Luxembourg and Portugal), but in some other countries, they are conducted at much larger time intervals of up to five to seven years (in France). In Finland and Sweden, inspections do not take place after a fixed time period, but upon request following complaints. Inspections are conducted by a team of inspectors in many countries (in the United States, for example, a multidisciplinary team of professionals is involved); in some other countries, however, inspections are carried out by a single person (e.g. Spain). Usually, an authorised accreditation body is responsible for training inspectors.

Another aspect that should be considered in the context of improving the quality of long-term care services is the incentive scheme for care providers. One measure to incentivise providers to enhance quality levels is public reporting. The purpose of public reporting is to increase transparency and provide information to care recipients. Requirements for public reporting differ across countries: in the United States, Germany and the Netherlands, for example, public reporting is compulsory; whereas in other countries (e.g. Finland and Spain), information is made available to the public on a voluntary basis. The frequency of reporting ranges from a few months (for example, in the United States) to one year (e.g. in Japan and Germany). The information provided includes aspects such as basic administrative information and inspection results. In general, there is a trend towards providing information about patient centredness (for example, meal choice, social activities) and clinical ef-

[1] See DICE Database (2014c) www.ifo.de/w/3BwDgiN6b for an overview of legislation concerning long-term care quality.
[2] See DICE Database (2014a) www.ifo.de/w/GrDVuXsy for an overview of regulation of long-term care providers.

fectiveness (e.g. rate of falls), rather than merely reporting on staffing and care environment (for example, beds and services). Another way of incentivising providers to improve the quality of their services is to introduce payment schemes based on performance. These schemes often combine public reporting with financial incentives and stimulate competition among care institutions with a view to improving quality. Such schemes have only been introduced in a few countries to date, and there has not yet been any systematic evaluation of the different schemes. According to OECD/European Commission (2013), preliminary evidence suggests that there is no direct causality between payment schemes based on performance and quality improvements. However, there could be positive "side-effects": Since more information is made available to the public, the incentive for care providers to enhance the quality level may increase. One example of such schemes is the Value Incentive Programme in Korea, whereby the performance of each care provider is evaluated and the best ten percent of providers earn a financial reward. Similar incentive schemes also exist in the United States and Japan.[3]

Long-term care workforce requirements

An important factor influencing the quality of care is the long-term care workforce. Educational and training requirements for workers in long-term care institutions vary significantly across OECD countries. In the United States, for example, certified care workers need 75 hours of training; whereas in Japan, three years of experience are necessary to obtain an equivalent degree.[4] Requirements for workers providing care services in institutions have been strengthened in some countries in recent years. In Sweden, for example, an education programme for care workers without any formal qualification has been started; and in Spain, every care worker is required to obtain a professional qualification by 2015. An aspect also taken into account by a number of training programmes is dementia care. For example, the Affordable Care Act in the United States requires specific training in caring for residents of long-term care institutions suffering from dementia; and in Ireland, care staff working with dementia patients can participate in specialist training programmes. Training requirements for workers providing care at home are often less strict than requirements for workers in institutions. In Austria,

for example, care workers in institutional settings need 1,600 hours of training, whereas only 400 hours are necessary for care workers in home settings. In general, workers providing care at home are often reported to lack the relevant qualifications. Due to preferences for care at home, however, according to OECD/European Commission (2013), it will become necessary to introduce higher quality standards in home settings. Another important issue is the training of long-term care workers after they have been employed. Continuous education is only compulsory for care workers in very few countries; in the United States, for example, 12 hours of continuing education must be completed every year. Generally, it is often the case that far more effort is put into ensuring that workers fulfil the conditions for being employed (no criminal history, for example) than into monitoring them after their employment. In many OECD countries, there is no process to monitor if a care worker commits a fault after being employed. Hence, post-employment workforce policies are decisive for improving the quality of long-term care services.

Conclusion

To conclude, it can be said that in recent years various measures have been taken to improve the quality of long-term care services in several countries. Given the growing importance of the issue of long-term care in the decades ahead, this topic looks set to remain a key policy focus area in the future.

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[3] See DICE Database (2014b) www.ifo.de/w/3tTNDYBZw for an overview of incentive schemes.
[4] See DICE Database (2014d) www.ifo.de/w/nSynxQW9 for an overview of long-term care workforce requirements.

DEPOSIT INSURANCE: REIMBURSEMENT OF DEPOSITORS

Aside from bank supervision, bank resolution schemes and the provision of emergency liquidity, deposit insurance constitutes a key element of the financial safety net in 113 jurisdictions worldwide (IMF 2013, IADI 2014). Deposit insurance aims to minimize the risk of bank runs and, thus, keep the financial system stable (Schich 2008). This was illustrated in the Fall of 2008 when the fear of bank runs led politicians around the world to increase the coverage level of their country's deposit insurance (Schich 2008).

According to Beck (2003), deposit insurance embodies a trade-off between financial stability and market discipline. On the one hand, a high coverage prevents destabilizing bank runs by depositors. On the other hand, monitoring efforts and the exertion of market discipline will be reduced by depositors if their deposits are fully covered. This may incentivize banks to engage in riskier activities. Thus, increased financial stability provided by deposit insurance comes at the cost of moral hazard.

An adequate coverage level and a credible reimbursement scheme solve this trade-off. Beck (2003) suggests that large depositors, who are most able to exert market discipline, are not covered under the insurance scheme and thus complement the supervisory part of the financial safety net. In addition to adequate coverage, credible reimbursement procedures are vital for the functioning of deposit insurance. If depositors do not perceive deposit insurance as credible, that is, they do not expect reimbursements, bank runs will happen in case of a bank failure, independent of the existence of deposit insurance. Similarly, if uninsured depositors expect to be reimbursed in the case of bank failure even without explicit deposit insurance, they will reduce their monitoring efforts.

Table 1 shows two aspects that influence the credibility of deposit insurance, namely the number of compensated depositors, as well as the legally allowed and actual timeframe for reimbursement (IMF 2013). The first two questions ask whether all insured depositors were fully compensated the last time a bank failed and whether, additionally, any uninsured depositors received compensation. The third and fourth question allow for the comparison of the legally required timeframe for the reimbursement of depositors, and the time taken to com-

plete this process in practice. The results are excerpts from the World Bank Surveys on Bank Regulation and Supervision in 2007 and 2012.

The first question asked by the World Bank refers to the compensation of insured depositors. If not all insured depositors were compensated, depositors might be less trusting in future crises and the deposit insurance's credibility is likely to decrease. In the period 2008–2010 four of 32 countries (Ireland, Iceland, UK and Australia) did not wholly compensate all insured depositors. Six countries did not answer this question[1].

The second question deals with the reimbursement of uninsured depositors. Some countries compensated more depositors than were actually insured the last time a bank failed. The risk in compensating more depositors than are actually insured lies in the perception of the insurance system by uninsured depositors. The extension of the insurance coverage signals politicians' willingness to bail out large, uninsured depositors too, who originally should have exerted market discipline (Schich 2008). Consequently, these depositors reduce their efforts to monitor banks in the future (Beck 2003). For the period 2005–2006 this was the case in eight of 36 countries and between 2008 and 2010 in eight of 32 countries (eight and six countries respectively did not answer this question). Three countries – Germany, Lithuania and Norway – answered that they had compensated more depositors than were actually insured in both periods.

The two remaining questions make it possible to compare the period within which reimbursement had to take place according to legal obligations and the actual time it took for the depositors to get fully reimbursed. The European Union countries are legally obliged to compensate depositors within 20 days (IMF 2013). Denmark, the Netherlands, Norway, Spain, Turkey, and Norway fulfilled their obligation in less than the allowed time. By contrast, in Luxemburg, Switzerland, Slovenia, and Iceland it took longer to reimburse the depositors than legally allowed between 2008 and 2010. The shortest time allowed and needed in practice to reimburse depositors is one day in the USA.

In conclusion, deposit insurance constitutes a key element of the financial safety net of more than a hundred countries around the world. Aside from an adequate

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[1] Although not yet included in the 2012 Survey, the rescue strategy of the Cypriot banking sector imposed in spring 2013 merits attention. For the first time all deposits, both uninsured and insured, were levied with a tax (6.75%-9.9%) to raise the money needed to stabilize the troubled banking sector (Sibert 2013).

coverage level, a credible reimbursement scheme determines the functioning of deposit insurance. Countries differ in terms of reimbursed depositors in the case of a bank failure and in the difference between the time allowed and needed until depositors are reimbursed. This might have implications for the functioning of deposit insurance schemes in the various countries in the future.

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Table 1

Deposit insurance: reimbursement of depositors, 2008–2010				
Country	Were insured depo–sitors wholly compen–sated (to the extent of legal protection) the last time a bank failed?	Were any deposits not explicitly covered by deposit insurance at the time of the failure compensated when the bank failed (excluding funds later paid out in liquidation procedures)?		From the time of the event's trigger, within how many days is the deposit insurance scheme legally obligated to fully re-imburse insured depositors?	In general, how long (in days) does it take in practice to pay depositors in full?
	2008-2010	2005-2006	2008-2010	2008-2010	2008-2010
Austria	Yes	No	No	20	–
Belgium	Yes	No	No	20	–
Bulgaria	Yes	Yes	No	20	20
Croatia	Yes	Not available.	No	30	30
Cyprus	–	Not applicable.	–	20	–
Czech Republic	–	Yes	–	–	--
Denmark	Yes	No	No	20	14
Estonia	Yes	Not available.	Yes	20	–
Finland	Yes	No	No	20	–
France	–	No	–	20	–
Germany	Yes	Yes	Yes	20	–
Greece	Yes	No	No	20	–
Hungary	Yes	No	No	20	–
Ireland	No	No	No	20	20
Italy	Yes	No	Yes	20	–
Latvia	Yes	No	No	20	–
Lithuania	Yes	Yes	Yes	30	30
Luxembourg	Yes	No	No	30	180
Malta	–	Not available.	–	20	–
Netherlands	Yes	No	No	90	75
Poland	–	No	–	20	–
Portugal	Yes	No	No	20	20
Romania	Yes	No	No	20	–
Slovak Republic	Yes	Yes	No	30	20
Slovenia	Yes	Not available.	Yes	30	90
Spain	Yes	No	No	20	7
Sweden	–	No	–	–	–
United Kingdom	No	No	No	20	7
Iceland	No	–	No	90	365
Macedonia	–	No	–	–	–
Montenegro	–	–	–	45	–
Serbia	Yes	–	No	30	30
Norway	Yes	Yes	Yes	90	21
Switzerland	Yes	Yes	No	20	90
Turkey	Yes	–	Yes	360	45
Australia	No	Not available.	No	–	–
Canada	Yes	Yes	No	–	35
Japan	–	No	–	–	–
Korea	Yes	–	No	–	–
New Zealand	–	Not available.	–	–	–
United States	Yes	Not available.	Yes	1	1

Source: DICE Database (2013).

NEW AT DICE DATABASE

Recent entries to the DICE Database

In the third quarter of 2014, the DICE Database received a number of new entries, consisting partly of updates and partly of new topics. Some topics are mentioned below.

- Toll: Charges for Heavy Goods Vehicles in Europe
- Development of Infrastructure Charging Systems in the EU and Switzerland
- Objectives of Road User Charges in the EU
- Incentive Schemes for Long-term Care Providers
- Legislation Concerning Long-term Care Quality
- Conditions for Sickness Benefits
- Electricity Net Generation
- Overview of State-owned Enterprises and Partly State-owned Listed Enterprises
- OECD Competition Law and Policies Indicators
- PISA 2012: Main Results
- Gross/ Net Pensions Replacement Rates

The interactive graphics application **Visual Storytelling** has been further expanded.

FORTHCOMING CONFERENCES

CEPAR & CESifo Workshops: Pension Taxation, Population Ageing, and Globalisation (Part 1, Sydney)
17–18 November 2014, Sydney

This conference will take the form of two interrelated and sequential workshops on Pension Taxation, Population Ageing, and Globalisation, organised jointly by CEPAR and CESifo. The first workshop will be a 2-day event in Sydney on November 17-18 2014, at which first drafts of selected papers will be presented and the Australian perspective will get more attention. A second 2-day workshop will take place in Munich on September 3-4, 2015, where revised and further papers with a European/international perspective will be presented. Please refer to the call for papers for further details.
Scientific organisers: Prof. John Piggott, Ph.D., Prof. Dr. Robert Holzmann, Prof. em. Dr. Dr.hc. Bernd Genser

9th Workshop "Macroeconomics and Business Cycle Analysis"
20–21 November 2014, Dresden

The 2-day workshop is jointly organized by the Ifo Institute Dresden Branch and the Helmut-Schmidt-University Hamburg. Its aim is to provide a forum for current research results from the field of macroeconomics and business cycle research and to contribute to a better networking of young researchers at the same time.
Scientific organisers: Prof. Dr. Michael Berlemann, Robert Lehmann, Michael Weber

8th Workshop on Political Economy
28–29 November 2014, Dresden

CESifo, the Center of Public Economics at TU Dresden and the Ifo Institute for Economic Research Dresden will jointly organize a workshop on Political Economy. In the tradition of the previous workshops, the conference will take place in Saxony´s capital Dresden. The two-day workshop will serve as a forum to present current research re-sults in political economy and will give researchers the opportunity to network. The keynote speakers will be Ekaterina Zhuravskaya (Paris School of Economics) and Roland Vaubel (University of Mannheim).
Scientific organisers: Prof. Dr. Christian Lessmann, Dr. Gunther Markwardt

5th Ifo Conference on "Macroeconomics and Survey Data"
5–6 December 2014, Munich

On December 05-06, 2014, the Business Cycle Analysis and Survey Department of Ifo in association with Rüdiger Bachmann (University of Frankfurt) and Eric Sims (University of Notre Dame) will organize a conference in Munich on "Macroeconomics and Survey Data". The conference is intended to discuss ongoing research on survey and micro data and its role and usage in macroeconomics. Papers, theoretical, empirical and poli-cy oriented, are actively solicited on issues like (the list below is not exhaustive): methodology of business surveys, uncertainty modelling, survey data and the business cycle, transmission of cyclical fluctuations, forecasting performance of survey data in business-cycle research, usage of micro-data in macroeconomics.
Scientific organisers: Dr. Klaus Wohlrabe, Prof. Dr. Ruediger Bachmann, Dr. Eric Sims

NEW BOOKS ON INSTITUTIONS

Governance, Regulation and Bank Stability
Palgrave Macmillan Studies in Banking and Financial Institutions
Edited by Ted Lindblom, Stefan Sjögren, Magnus Willesson
Palgrave Macmillan, 2014

The European Union and Global Financial Regulation
Lucia Quaglia · Oxford University Press, 2014

CESifo 🎲 DICE

THE DATABASE FOR INSTITUTIONAL COMPARISONS IN EUROPE

The Database for Institutional Comparisons in Europe – DICE – was created to stimulate the political and academic discussion of institutional and economic policy reforms. DICE is a unique database offering comparative information on national institutions, regulations and economic policy. Although DICE is not a statistical database, it also contains data on the outputs (economic effects) of institutions and regulations where relevant.

DICE covers a broad range of institutional themes: Business and Financial Markets, Education and Innovation, Energy and Natural Environment, Infrastructure, Labour Market and Migration, Public Sector, Social Policy, Values and Other Topics.

The information is presented in tables (text or data), graphics (interactive application Visual Storytelling), and reports. In most cases, all EU countries are covered as well as some other major OECD countries. Users can choose between current comparisons and time series that show developments over time.

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