

Measuring What Matters in Public Procurement Law: Efficiency, Quality and More

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Modern public procurement laws—such as the U.S. Federal Acquisition Regulation—are based on the principle of efficiency. Recent revisions have introduced the concepts of sustainability and anti-corruption. Decision makers are now confronted with new goals that ask for trade-offs. However, no structured method to assess their effects exists. This Article stresses the need for regulatory impact assessments to evaluate the economic consequences of public procurement regulation. It suggests two evaluation frameworks and defines parameters to measure the benefits of public procurement. Overall, the Article aims at informing the policy debate on better procurement regulation, suggesting a “more economic approach.”

Keywords: public procurement, efficiency, quality, law and economics, measuring, regulatory impact assessment, cost-benefit analysis

INTRODUCTION

For a long time, legal literature on public procurement was mainly focused on the practical implementation of the rules (Alonge & Bednar, 1999; Gottlieb & Phelps, 1991; Schooner, 1991). It was not before the 1980s when economists developed an academic interest in public procurement, which concentrated on auction models (Manelli & Vincent, 1992; McAfee & McMillan, 1987) and the principal-agency theory (Laffont & Tirole, 1993). The academic interest in the legal field was sparked a few years later by the introduction and revision of the WTO-Government Procurement Agreement (WTO-GPA) in 1994 and 2012. The agreement triggered an intensive discussion about the goals and their hierarchies in government contracting (Arrowsmith, 2012; Beyeler, 2008; Dekel, 2008; Schooner, 2002). Despite remarkable achievements in both fields, a combined law and economics approach to better understand the economic consequences of government contract rules does still not exist. In particular, no study has properly assessed the costs and especially the benefits of different procurement procedures and their potential to meet both economic and non-economic public procurement goals. This Article aims to fill this gap.

In the U.S., the need for agencies to conduct regulatory cost-benefit analyses (CBAs) is the standard procedure for new regulations ("Executive Order 12866," 1993). A recent and frequent user of CBAs is the U.S. Environmental Protection Agency (EPA). But so far, no comprehensive cost-benefit analysis of public procurement regulation has been conducted. The only regulatory impact analysis (RIA) conducted on the U.S. Federal Acquisition Regulation (U.S. FAR) was the one on the fair pay and safe workplaces rule (U.S. Department of Defense, General Services Administration, NASA, & Department of Labor,

2014). Also, in Europe some efforts have been directed towards evaluating public procurement regulation. The European Commission has conducted an Impact Assessment of the Proposed EU Public Procurement Directive 2014 (EU Procurement Impact Assessment) (European Commission, 2011) and commissioned an economic study on the “Cost and Effectiveness of Public Procurement in Europe” (PWC Study) (PWC, 2011). Both analyses focus on costs rather than benefits. A similar image displays in other jurisdictions, such as Switzerland. During the revision phase of the Swiss Public Procurement Act (Swiss PPA), which will enter into force in 2021, claims to shed more light on the economic consequences of regulation have been raised. The Swiss Federal Audit Office (Eidgenössische Finanzkontrolle) has voiced harsh criticism on the lack of economic insights of Swiss regulations, namely that there are rarely any reliable forecasts and not carefully thought out ideas (Eidgenössische Finanzkontrolle, 2016).

For these reasons, this Article will dwell into the questions of why, what and how to measure the economic consequences of public procurement regulation, with a focus on benefits. The First Part gives reasons on why an economic analysis of public procurement law is not only desirable but necessary. Before discussing the different existing methods to assess the economic impact of regulations (Third Part), the Second Part will give a quick overview of the different principles and goals of government purchasing that will be assessed. Against this backdrop, this Article suggests two frameworks to evaluate the economic impact of government contracting. The first is a *Benefit Matrix* that develops proxies to identify, quantify and, where possible, monetize the benefits of government contracting. The second framework is a *Decision Matrix* that provides a structure for decision makers to assess to which extent different procurement procedures achieve the procurement goals. Whether separate or in combination, the two frameworks set the ground for a more informed policy debate on the suitability of different procurement procedures in achieving the traditional and new public procurement goals.

WHY TO MEASURE PUBLIC PROCUREMENT LAW

This Part gives two reasons for why measuring public procurement law makes sense. First, taking a “more economic approach” allows decision makers to make better-informed decisions based on evidence. Second, the principle of efficiency forms an integral part of public procurement law and is closely related to budgetary rules, which mandate government officials to efficiently manage public resources.

Informed Decisions Based on Evidence

The main reason to evaluate the effects of law on the economy is that it provides for an objective, rational, and forward-looking benchmark for agencies, legislators, and judges. The U.S. Office of Management and Budget (OMB) states that benefit-cost analyses “provide[s] decision makers with a clear indication of the most efficient alternative, that is, the alternative that generates the largest net benefits to society” (U.S. Office of Management and Budget, 2003). In the EU, regulatory impact assessments serve as “a tool to help [the decision makers] reach well-informed decisions” (European Parliament, 2016).

Law and economics, or the economic analysis of law has its origin in legal realism, an evidence-based approach to law from the 1920s (Holmes, 1897). Law and economics uses economic concepts to explain and predict the effects of laws and assesses which rules are economically efficient (Friedman, 1987). Normative law and economics, which is the theoretical concept underlying CBAs, formulates policy recommendations based on the economic consequences of law. Its key concept is Kaldor-Hicks efficiency. A policy change is Kaldor-Hicks efficient if the winners from the policy change can theoretically compensate the losers for their loss (Posner, 2007).

But aside from striving for more efficient regulations, RIAs can also increase the quality of regulations. A study from the European Commission found that the feedback from stakeholders serves as an effective quality control mechanism for the RIAs in the EU (European Commission, 2010). Another valuable side effect of evaluating the economic impact of regulations is that it forces the government to collect data and thereby create transparency on the consequences of regulation. Transparency not only allows for better-informed political and legal decisions but also creates more accountability of the government towards the public.

The Principle of Efficiency in Public Procurement Law

Most national public procurement laws rely on the principle of efficiency or the efficient use of public resources. Other than the above described Kaldor-Hicks efficiency, which uses efficiency to compare different policy outcomes, efficiency in the context of government purchasing means cost-efficiency and is closely related to budgetary rules.

For example, the U.S. Federal Acquisition Regulation states as guiding principle “to minimize administrative operating costs in order to ensure that maximum efficiency is obtained” and to “ensure the efficient use of public resources” (“U.S. FAR,” 1984 Section 102-2(b) and (d)). Similarly, the Swiss Public Procurement Act (Swiss PPA) lists the efficient use of public resources as one of its four main purposes (“Swiss PPA,” 1994). While some authors contest the existence of an efficiency principle in the EU procurement regime and relegate it to the national sphere (Arrowsmith, 2012), others are more favorable towards acknowledging the role of efficiency at the EU level (Comba, 2014; Sanchez Graells, 2010).

Because of their nature as public expenditure, government contracts must follow some house-keeping rules. Government agencies that purchase goods, services, and works from private companies have to procure within budgetary constraints and have to save taxpayers’ money. Hence, public procurement is closely linked to budgetary laws, which rely on the principle of economy and efficiency (“Deutsche Bundeshaushaltsordnung,” 1969 § 6 II; “Schweizer Finanzhaushaltsgesetz,” 2005 Article 12(4)).

WHAT TO MEASURE IN PUBLIC PROCUREMENT LAW

After having explained why it is valuable to measure public procurement regulation, this Part describes *what* to measure. Rather than specifying the object of measurement—which will either be a regulation or different regulatory alternatives—this Part aims at identifying the relevant *decision criteria* against which the regulation should be measured. Decision criteria can be goals or principles (van Aaken, 2003, p. 312). This Part will touch upon the theoretical distinction between principles and goals in public procurement law and give a brief summary of them. It will also set the starting point for the benefit analysis by illustrating the link between legal goals and economic benefits by means of the U.S. Clean Air Act.

Ends and Means of Public Procurement Law

Often ends and means are used interchangeably. There is no clear distinction of what counts as ends and what as means, and what the hierarchy between those is (Arrowsmith, 2012; Beyeler, 2008; Dekel, 2008; Schooner, 2002). Most of the confusion comes from the different perspectives that political decision makers and legal scholars take (Dworkin, 1978, pp. 38-39).

Decision makers are often concerned with the larger economic and political goals a law should achieve. Laws and legal experts on the other hand, are often more concerned about *how* to apply the law. For example, Congress declared it to be its policy to promote “economy, efficiency, and effectiveness in the procurement of property and services” (“U.S. Office of Federal Procurement Policy Act,” 1974 Section 2). The Swiss PPA states in Article 1 that the federal government wants to make the procurement process transparent, strengthen the competition among suppliers, foster the efficient use of public resources and ensure equal treatment of all suppliers (“Swiss PPA,” 1994 Article 1). These legal principles of efficiency and transparency help to run the procurement process more smoothly (Trepte, 2004, p. 4), to eventually achieve the overarching goals of the procurement, which I would define as free market access, best value for money and good governance (see next Part).

While this discussion is mostly theoretical in nature, for the purpose of the following frameworks this Article will distinguish between goals and principles as outlined in Table 1. For example, fair competition helps to create free market access, and transparency leads to good governance and less corruption.

TABLE 1
ENDS AND MEANS OF PUBLIC PROCUREMENT LAWS

Ends (what)	Means (how)
1. Free market access	- Fair competition among suppliers - Non-discrimination between national and foreign suppliers
2. Best value for money	- Efficient use of public funds - High quality and sustainable projects
3. Good governance	- Equal treatment of suppliers - Transparency of award procedures - No corruption and collusion

Towards a Common Notion of Public Procurement Goals

To measure whether the different procurement goals have been achieved, this Section aims at creating a common notion of the most relevant public procurement goals relying on largest public procurement systems: the WTO-GPA, the U.S. FAR and the EU Public Procurement Directive (EU PPD).

One goal of government contracting is *free market access* or free trade. Modern procurement laws reach back to post-World War II trade liberalization of the 1990s. Free trade in government contracting allows to enlarge the market and supplier base by not discriminating or limiting competition on the basis of supplier nationality. Most public procurement systems, especially regional and international, put strong emphasis on free market access ("EU PPD," 2014 Recital 1; "WTO-GPA," 2012 Preamble). While this theoretical goal is important for international trade, in practice free market access only plays a minor role in public procurement. In the U.S. and Switzerland, less than 10% of the contracts are awarded to foreign suppliers (Congressional Research Service, 2018; Eidgenössisches Finanzdepartement, 2017). Similarly, the European Commission reports that only 13% of awards were cross-border trades by value during 2006-2009 (European Commission, 2011, p. 125).

Arguably the most important goal in government contracting is the purchasing of high-quality goods, services and works for a reasonable price, most commonly referred to as *best value for money*. The two components of this goal are price and quality. Relying on price is the least-disputed element in national procurement regimes since purchasing authorities are required to save taxpayer's money. While Arrowsmith recognizes "commercial aspects" at the national level, notably the value for money and efficient procurement process, she denies their applicability at the EU regional level, relying on the wording of the EU Treatise (Arrowsmith, 2012, p. 36). The notion of quality has undergone a large shift during the last few years. While it initially entailed technical qualities and timely delivery, many procurement laws now also understand ecological and social sustainability as aspects of quality ("EU PPD," 2014 Article 67; "Revised Swiss PPA," 2021 Article 2; "U.S. FAR," 1984 Subpart 23.1; "WTO-GPA," 2012 Article XXII 8(a)(iii)). The German Act against Restraints of Competition (GWB) still refers to those aspects as "vergabefremde Kriterien" [criteria foreign to the award] ("German GWB," 1998 § 97(4)). At the EU level, these criteria are often referred to as "horizontal policies"—horizontal because they form part of the different national rather than the top-down EU regime (Arrowsmith, 2012, p. 40).

The third most important goal in public procurement is *good governance*. It not only relies on the traditional procurement principles of transparency and fairness, but also includes the prevention of corruption and collusion. Similar to the integration of sustainability into government purchasing, anti-corruption requirements are a product of the 21st century. Integrity concerns were added to the public procurement agenda around 2005 when the OECD found public procurement to be specifically vulnerable to corruption due to its large economic dimension and enacted the OECD Principles for Integrity in Public Procurement (OECD, 2005, 2009). As a consequence, integrity and anti-corruption concerns have found their way into revised public procurement laws at the national, regional, and international level ("EU PPD," 2014 Recital 126; "Revised Swiss PPA," 2021 Article 1; "WTO-GPA," 2012 Preamble).

Hence, the largest procurement laws rely on the trinity of free market access, best value for money and good governance. The later suggested frameworks will provide a structure to evaluate whether and to what degree these three goals have been met.

Translating Goals into Benefits—Illustrated by Means of the U.S. Clean Air Act

To evaluate the economic effects of regulations and reduce the regulatory burden, many jurisdictions have introduced cost-benefit analyses. In the U.S., all major regulations need to pass a cost-benefit test before being promulgated ("Executive Order 12291," 1981).

While CBAs typically analyze both costs and benefits, more recent CBAs of environmental regulation in the United States have focused on the evaluation of qualitative benefits, such as air quality or human health (U.S. Environmental Protection Agency, 2011). In Europe, the RIAs still mostly focus on costs. For example, the PWC Study focused on the “cost and effectiveness” of procurement regulation rather than the benefits (PWC, 2011). One explanation is that costs are easier to measure because they are more narrowly defined as “direct costs to the government in administering the regulation, and to businesses in complying with the regulation” (Breyer, Stewart, Sunstein, Vermeuel, & Herz, 2017, p. 21; "Executive Order 12866," 1993 Section 6(c)(ii); U.S. Environmental Protection Agency, 2014 Section 8-3 and 8-5) and they are already expressed in dollar amounts.

Benefits, on the other hand have a much broader scope and are rarely expressed in monetary terms, requiring for a more sophisticated evaluation mechanism. For example, Executive Order 12886 defines benefits to encompass “the promotion of the efficient functioning of the economy and private markets, the enhancement of health and safety, the protection of the natural environment, and the elimination or reduction of discrimination or bias” ("Executive Order 12866," 1993 Section 6(c)(i)). The notions of health, safety and environment are not only very broad, but also lack a clear pricing mechanism.

But what are the benefits of a regulation? Benefits can be understood as the economic equivalent of legal goals. This definition can be best explained by a concrete example: The Cost-Benefit Analysis of the U.S. Clean Air Act of 2011 (Clean Air Act CBA). In its purpose statement, the U.S. Clean Air Act states “to protect and enhance the quality of air resources so as to promote the public health and welfare and the productive capacity of its population” ("U.S. Clean Air Act," 1963 Section 7401). In the CBA, these goals have been translated into three economic benefits: (1) air quality benefits, (2) human health benefits, and (3) ecological and other welfare benefits (U.S. Environmental Protection Agency, 2011, p. 51). These benefits are achieved with a set of instruments, such as emission standards, research programs, monitoring studies, prohibitions and permits (see Table 2).

TABLE 2
BENEFITS AND INSTRUMENTS OF THE U.S. CLEAN AIR ACT

Benefits (what)	Instruments (how)
1. Air quality benefits 2. Human health benefits 3. Ecological and welfare benefits	- Emission standards - Research programs and new gasoline formulations - Monitoring studies - Prohibition of vehicles and closure of power plants - Permits to build new stationary sources - etc.

HOW TO MEASURE PUBLIC PROCUREMENT LAW

After having defined the relevant decision criteria, the next step is to find the best method to measure the economic effects of a regulation. This Part discusses the three main methods used in regulatory impact assessments: (1) cost-benefit analysis, (2) cost-effectiveness analysis (CEA) or multi-objective decision-

making, and (3) economic impact analysis (EIA). While all these methods have a different focus, they all depart from a baseline. The baseline of an economic analysis describes an initial *status quo* scenario that is used for comparison with one or more alternative scenarios. In most economic analyses the baseline is defined as the world absent the proposed regulation or policy action (U.S. Environmental Protection Agency, 2014 Section XV). However, the baseline may also be a current regulatory instrument that is compared to an alternative policy instrument (U.S. Department of Defense et al., 2014).

Cost-Benefit Analysis: Monetizing Regulatory Actions

This Section will give an overview of the origin and scope of the cost-benefit analysis and will illustrate the method by means of the U.S. Clean Air Act before concluding with a critical appraisal.

Origin and Scope of Cost-Benefit Analyses

CBAs evaluate the costs and benefits of regulatory actions on the economy, society and environment. Forming part of normative law and economics, CBAs are based on the concept of Kaldor-Hicks efficiency. Its underlying idea of aggregated utility functions and the resulting net benefit (or loss) provides the theoretical underpinning of cost-benefit analyses (van Aaken, 2003, p. 217). Due to the relatively simple methodology (netting of costs and benefits) and their clear-cut goal (economic efficiency), CBAs have made their way into policymaking. Whenever the benefits of a new regulation outweigh the costs, the enactment of the regulation is considered efficient and the new regulation will be promulgated.

The United States is a prominent advocate of regulatory CBAs. The requirement for new regulations to pass a cost-benefit test dates back to 1981, when President Reagan issued Executive Order 12291 ("Executive Order 12291," 1981). Since then, all new regulations and major rules need to pass a cost-benefit test. Major rules are defined as having "an annual effect on the economy of \$100 million or more, or adversely affect[ing] in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety" ("Executive Order 12866," 1993 Section 3(f)(1)). CBAs in the U.S. do not only outperform efforts in other jurisdictions in terms of their large number, but also regarding their depth, and detailed calculation of benefits. For example, to assess air quality regulations, the EPA has conducted around 50 regulatory impact assessments, 20 benefit reports, and 60 economic impact assessments (EPA, 2020). To guarantee for high quality CBAs in the U.S., the Office of Information and Regulatory Affairs (OIRA) acts as supervising authority. It can exert veto power to prevent the promulgation of regulations where the CBA is insufficient, of poor quality, or does not demonstrate that the benefits of the draft rule are likely to justify regulatory costs ("Executive Order 12291," 1981; Renda, 2011, p. 27).

Other jurisdictions have followed the American example. The European Commission has adopted methods for assessing the impacts of policy proposals in 1986, when the Business Impact Assessment system was launched under the UK presidency (Renda, 2011, p. 43). But the focus of these assessments was considered too narrow, only focusing on business enterprises and not considering social welfare (Renda, 2011, p. 43). For this reason, the EU moved towards a "better regulation" approach. In 2003, the EU parliament issued the Interinstitutional Agreement on Better Law-Making that provides the legal basis for today's impact assessments of EU legislation, including EU directives, regulations and non-binding legislative initiatives (European Parliament, 2016). It requires an *ex ante* examination of "economic, environmental and social impacts" of legislative proposals, and their effects on stakeholders (European Parliament, 2016 Section 12). On this basis, the Commission conducts Integrated Impact Analyses, such as the EU Procurement Impact Assessment (European Commission, 2011). The new Impact Assessment Guidelines of 2009 aim at relaxing the focus on the quantification of impacts by also allowing for non-quantitative analyses and multi-criteria assessments (European Commission, 2009; Renda, 2011, p. 61). Similar to OIRA's oversight function, the EU impact assessments are subject to supervision by the Regulatory Scrutiny Board, which was established in 2006. Even though the opinions of the Board are not binding, its *super partes* position and moral suasion on the Directorate-Generals (EU agencies) gives it

near-to binding powers. Its recommendations are usually followed by the Commission, which has the final decision power over the adaptation of legislations in the EU (Renda, 2011, p. 63).

Another country stressing the importance of CBAs is Switzerland. The fully revised Swiss Constitution of 2000 mandates the executive branch (Swiss Federal Council and administrative agencies) to ensure that “government measures are reviewed with regard to their effectiveness” ("Schweizer Bundesverfassung," 2000 Article 170). Public agencies, with the support of the Swiss State Secretariat for Economic Affairs (Staatssekretariat für Wirtschaft [SECO]) have issued 39 regulatory impact assessments since 2005, mostly on primary laws (banking act, data protection act, zoning act, public procurement act, financial services act) (SECO, 2020). Depending on the impact of the regulation on the economy, the agency either needs to perform a simple assessment (total of 18) or an extensive assessment (total of 21) (SECO, 2020). Even though most of the RIAs achieve to identify the relevant costs and benefits, none of the RIAs dwells into the quantification, let alone monetization of costs and benefits. In addition to these RIAs, the Swiss Federal Council (Switzerland’s president) is required to comment on “the potential impacts [of new legislation] on the economy, society, environment and future generations” ("Schweizer Parlamentsgesetz," 2002 Article 141(2)(g)). Despite this requirement, most dispatches of the Swiss Federal Council only include a few qualitative statements—lacking any quantitative analysis of economic effects (Eidgenössische Finanzkontrolle, 2016). Also, there is no supervisory authority in Switzerland to review the quality, approve or veto against *ex ante* impact assessments, such as the U.S. OIRA or the EU Regulatory Scrutiny Board. Even though regulatory supervision is not the focus of this Article, it is worthwhile noting that without any supervision, RIAs are not going to be taken seriously or achieve a reasonable quality level (Schöchli, 2016).

Quantifying Benefits—Illustrated by Means of the U.S. Clean Air Act

Because the quantification of costs has already achieved a lot of attention by literature, this Section will focus on the quantification of benefits. In recent years, the EPA has made great progress in quantifying benefits of environmental regulation. The EPA Guidelines for Preparing Economic Analyses follow a three-step approach (U.S. Environmental Protection Agency, 2014 Section 7-1): First, defining the benefits, second, quantifying the benefits by means of proxies, and third, monetizing the benefits by translating the benefits into dollar amounts. I have illustrated the three steps by means of the Clean Air Act CBA in Table 3 (U.S. Environmental Protection Agency, 2011):

TABLE 3
BENEFIT MATRIX OF THE U.S. CLEAN AIR ACT

Definition of benefits (goals)	Quantification of benefits (proxies)	Monetization of benefits (dollar amount)
1. Air quality benefits	- Concentration of emissions - Number of hospital admissions	- Willingness to pay (WTP) to avoid hospitalization
2. Human health benefits	- Number of premature deaths/mortality rate - Number of hospital admissions - Number of work loss days	- Value of a statistical life - Lost earnings and direct medical costs
3. Ecological and welfare benefits	- Agriculture and forest productivity (in pounds of crops) - Visibility (in deci-views) - Damage to infrastructure	- Yield losses avoided - WTP for increased visibility in national parks - Repair costs for damaged infrastructure

The definition of procurement goals and benefits has been discussed in detail above. The second step is the quantification of benefits. Benefits are usually quantified through countable units (ordinal data). For example, the Clean Air Act CBA accounts for the number of deaths, the number of products produced and the number of workdays lost resulting from an omission to regulate emissions (U.S. Environmental Protection Agency, 2011). A necessary prerequisite to quantify benefits is an in-depth understanding of measurable events and the choice of sensible proxies that are relevant in the specific field. For example, the Clean Air Act CBA also measures the emission concentrations and the damage to infrastructure, which is specific to environmental pollution. While the quantification of benefits offers a certain measurability of goals, it does not serve as a comprehensive comparative benchmark because it consists of different metrics that are not comparable. For example, comparing the number of deaths with decreased visibility would be like comparing apples with oranges. This is why we need a universal metric: the dollar amount.

Monetizing Benefits and Willingness to Pay

The third step is the monetization of benefits. This step is the most challenging step, especially when it comes to qualitative benefits, concepts that lack a pricing mechanism and are difficult to express in monetary terms. For this reason, Executive Order 13563, issued under the Obama administration, demands a qualitative analysis of all benefits that cannot be monetized ("Executive Order 13563," 2011). But before shirking away from monetizing benefits too quickly, sufficient effort needs to be put into the task. To monetize non-marketable goods, one measure is central: willingness to pay or WTP. I will illustrate the application and limitations of the WTP metric by means of the Clean Air Act CBA.

WTP translates non-measurable utility functions into measurable, monetized values. It constitutes the core measure of law and economics analyses that are based on the concept of efficiency. The EPA Guidelines define WTP as the preferred measure to evaluate changes in individual well-being as it provides "a full accounting of individual preferences across trade-offs between income and the favorable effects" (U.S. Environmental Protection Agency, 2014 Section XI). By surveying a large number of people from different demographics, WTP aims to reveal the underlying individual preferences for a marginal improvement in a non-marketable good, such as clean air, life, or time (U.S. Environmental Protection Agency, 2014 Section 5.3.3).

In the Clean Air Act CBA, surveys (stated preference studies) were conducted to establish the WTP for an increase in visibility. To estimate the value of recreational visibility, respondents in five states were asked about their WTP to protect national parks or wilderness areas within a particular region (U.S. Environmental Protection Agency, 2011 Section 6-28). To evaluate residential visibility, households across the U.S. were interviewed on their WTP to improve visibility conditions from a *status quo* to an improved visual range. The per-household WTP estimates for a hypothetical 10% improvement, ranged from \$14 to \$145. The broad range of values is due to different landscapes and vistas, populations and prevailing visibility conditions (U.S. Environmental Protection Agency, 2011 Section 6-29).

These measures and the applied three-step approach provide guidance to quantifying and monetizing the benefits of public procurement regulations, as applied in the benefit matrix below.

Critical Appraisal of Cost-Benefit Analyses

Regulatory cost-benefit analyses have been subject to much heated debate: First, it has been questioned whether CBAs are justified at all. Second, when the application of CBAs is recognized, there is a discussion on how to best measure the effects of regulations (Bronsteen, Buccafusco, & Masur, 2013; Masur & Posner, 2012). While the first debate is mostly a criticism of the theoretical assumptions of economic models, the latter is of a more practical nature and concerned with the actual measurement of effects. This Article—together with many other scholars (Bronsteen et al., 2013; Masur & Posner, 2012)—recognizes CBAs as having an informative value for decision makers. Therefore, this Section addresses the second issue.

The most prominent criticism regarding the measurement of costs and benefits is that CBAs often fail to monetize *all* effects, whether positive or negative, and that WTP does not capture the individuals'

entire utility function, but reduces people's preferences to how much they are willing to spend in a market economy (Bronsteen et al., 2013; Masur & Posner, 2012). Also, there is a discrepancy between the amount a person is willing to pay for a good (usually overestimated) and her willingness to accept (WTA) to give up a good (usually underestimated). The choice between these two measures largely depends on the original allocation of property rights (U.S. Environmental Protection Agency, 2014 Section 5-22). Related to the criticism of WTP and WTA is the argument that for effects that cannot be monetized, such as justice, equity or other distributive values, cost-benefit analyses create an anchor that makes it hard for policy makers to account for non-monetary factors. And finally, if non-marketable goods are assigned a market value, such as the value of life, these values often vary over time and across agencies.

I agree that valuations are not an exact science; they are estimations. But even though CBAs may face problems with the monetization of all costs and benefits, they often achieve two things: first, they help to *define* the goals and benefits of a regulation—which is often not clear from the regulation itself (see Section above), and second, cost-benefit analyses may *quantify* most effects and therewith offer a benchmark to compare the quantified benefits of different regulatory options with each other. Furthermore, the requirement to analyze and consider qualitative benefits, as demanded by Executive Order 13563 ("Executive Order 13563," 2011), gives non-monetizable values an adequate weight in the legislative process. Lastly, the variation of values over time and across agencies is a valuable feature and can inform the legislative process. The different values allow the public to challenge a de- or increase in values over time. For example, new EPA studies discounts future benefits at 0% while older CBAs apply a discount rate of 3% (Stern & Jacobs, 2007; U.S. Environmental Protection Agency, 2014 Section 6-18). Also, the differences across agencies allows agencies to compare their approaches and find the best one for their purpose. For instance, the Department of Transportation uses a higher value of statistical life (\$9.6 million) for CBAs than the EPA (\$7.4) (U.S. Department of Transportation, 2016; U.S. Environmental Protection Agency, 2014).

In conclusion, cost-benefit analyses offer a more objective, rational and forward-looking benchmark, as compared to subjective decision-making. This also explains the current trend of European regulators to quantify regulations. For instance, the Swiss parliament recently asked for the establishment of a supervisory authority, similar to OIRA, to strengthen the role of cost-benefit analyses (Flückiger, 2017). The objectivity and mapping of the benefits has inspired the design of the here suggested benefit matrix.

Cost-Effectiveness Analysis: Measuring Goal Achievement

This Section explains the goal, advantages and drawbacks of the cost-effectiveness analysis, an alternative regulatory impact assessment method to the CBA. It also discusses the multi-objective decision-making method, an approach that is very similar and often used in defense procurement.

Idea and Application of Cost-Effectiveness Analysis

Often cost-benefit and cost-effectiveness analyses are confused or used interchangeably. But they measure different things. The CEA examines the costs associated with obtaining a specific outcome or an additional unit of an outcome. It is designed to identify the least expensive way of achieving a given target, or the way of achieving the greatest improvement in some target with a given expenditure (U.S. Environmental Protection Agency, 2014 Section XV). Other than the cost-benefit analysis, the CEA does not aim at measuring the benefits, but instead puts emphasis on the costs spent to achieve a defined goal.

One study that assessed the costs of public procurement regulation is the PWC Study (PWC, 2011). The PWC Study measures the costs of different procurement procedures (open, restricted, and negotiated) and instruments (framework agreements, e-procurement, dynamic purchasing systems) (PWC, 2011, p. 7). To measure the effectiveness of the procedures and instruments, the Study relies on qualitative expert and industry interviews (around 7,300) (PWC, 2011, p. 10). The interviewees were asked to indicate how well the procedures achieve specific procurement goals (transparency, fairness and efficiency) on an ordinal scale from "not important" to "very important" (PWC, 2011, p. 109). However, the Study does not aim at or achieve to quantify and monetize the benefits of different procurement procedures.

The fact that benefits are not monetized is both an advantage and disadvantage of the CEA. On the one hand, it avoids the complicated process of monetization. On the other hand, it lacks the level of detail of a CBA and only provides results on a better/worse scale based on qualitative interviews.

Origin and Goal of Multi-Objective Decision-Making

An assessment method called multi-objective decision-making evolved after World War II to overcome the challenges of measuring non-monetary benefits in defense procurement (Melese, Richter, & Solomon, 2015, p. 5). While its origin and application go back to defense procurement, multi-objective decision-making has also been applied in other fields.

One example can be found in the EU Procurement Impact Assessment 2011. The Impact Assessment compares four legislative options to improve procurement procedures: no change, soft law, improved design, and expanded menu. It compares the potential of the four options to achieve three objectives: cost efficiency, best outcome for society, and achievement of an EU-wide market. It then rates the potential of the different options to achieve the objectives on a Likert scale (++ / + / $\approx$ / 0 / - / --), based on qualitative interviews.

Multi-objective decision-making offers two major advantages. First, it allows policy makers to consider non-monetary benefits, a major advantage over CBAs. Second, it gives decision makers a tool to assess several—sometimes competing—objectives and is not limited to one single goal. Especially for regulations that intend to achieve multiple goals—such as government procurement—this approach offers a good solution. Because of the possibility to compare different goals in a more qualitative manner, this approach builds the starting point for the suggested decision matrix below.

Economic Impact Analysis: Considering Distributional Effects

An economic impact analysis examines the distribution of monetized effects of a policy. The EIA can measure impacts on either a specific *sector*, and includes prices, production, employment, profitability, economic growth and competitiveness, or the revenues and expenditures of a *government* (U.S. Environmental Protection Agency, 2014 Section XV). EIAs evaluate both monetized effects, such as changes in industry profitability or government revenues, and non-monetized effects, like an increase in unemployment rate or the number of plant closures (U.S. Environmental Protection Agency, 2014 Section XV). Since 1993, the EPA has conducted EIAs for air pollution regulations, covering around 25 sectors, such as solid waste landfill, gasoline distribution, and mining (U.S. Environmental Protection Agency, 2011). Most of the EIAs encompass the following four elements (EPA, 2020):

- Industry profile, including market analysis
- Summary of regulatory alternatives and estimation of administrative costs
- Analysis of the economic impact on a sector
- Impact on small businesses

Hence, EIAs are both broader and more limited in scope than cost-benefit analyses. On the one hand, EIAs go beyond CBAs by not only measuring microeconomic data such as costs and benefits but also consider macroeconomic impacts such as price developments, export and employment rates. This holistic view creates a complete and more realistic picture of the total costs and benefits of a new regulation. On the other hand, EIAs go not as far as CBAs. EIAs are usually limited to a specific industry, such as the EIA of the new emission standards for the Plywood sector (U.S. Environmental Protection Agency, 2002). This sector-specific view entails the disadvantage that it creates a fragmentary picture, not considering the total costs and benefits of a regulation.

Consequently, EIAs are better suited to measure the economic effects of a regulation for a specific industry, rather than estimating the net benefits. Since most government procurement regulations are not sector-specific but generalist, EIAs are not the appropriate method to measure the effects of government contracting.

A BENEFIT MATRIX FOR PUBLIC PROCUREMENT LAW

This and the next Part design two frameworks that assess the effects of public procurement law on the economy. The first, a *benefit matrix*, follows a similar approach like the cost-benefit analysis and depicts different proxies to quantify and monetize procurement benefits. The second, a *decision matrix*, is inspired by the multi-objective decision-making and assess different procurement procedures and their potential to achieve the defined procurement goals. The decision matrix's rating is informed by the quantitative results of the benefit matrix.

Method to Measure Procurement Benefits

The focus of previous RIAs was on the costs of public procurement regulations (European Commission, 2011; Jaeger, 2006; PWC, 2011). For this reason, this Section focuses on measuring the benefits. It is worthwhile noting that in the context of government procurement, benefits are often expressed in cost savings. Because public procurement forms part of the government's expenditure side, saving taxpayers' money counts as major benefit. For example, litigation costs that can be avoided is a benefit to the government and the public at large. But before dwelling into the midst of the benefit analysis, I want to define the scope and perspective of the benefit matrix.

Similar to most CBAs, this benefit matrix takes a holistic approach and considers the benefits for the government and for businesses. The taxpayers' perspective is reflected by the government's mandate to save taxpayers' money. The benefit matrix first *defines* the benefits. As noted earlier, most national procurement regimes rely on three overriding goals or benefits: free market access, best value for money, and good governance. These benefits are then paired with the underlying principles, which include transparency, equal treatment, non-discrimination, competition and efficiency (see Table 1). As a second step, the matrix *quantifies* the benefits. For that purpose, the matrix suggests a list of the most relevant proxies to measure the different goals and principles. For example, to measure the benefit of free market access, the benefit matrix suggests measuring the number of bidders (for competition), and the number of foreign bidders (to reflect the principle of non-discrimination). To quantify procedural efficiency, the matrix suggests measuring person-hours spent to prepare the offer by the contractor and person-hours spent to evaluate the offer by the agency. Lastly, the matrix aims to *monetize* the benefits, which means to convert quantified benefits into dollar amounts. As elaborated earlier, the monetization of benefits is the most challenging task since benefits often lack a clear pricing mechanism.

Quantified and Monetized Procurement Benefits and Critical Appraisal

This Section depicts the benefit matrix with a list of the most relevant proxies to evaluate the economic benefits of government contracting (see Table 4 below). Some of the proxies are inspired by CBAs from environmental regulation (see the Clean Air Act CBA), and other proxies stem from my own practice experience and interviews with procurement experts. The benefit matrix is followed by a discussion, which addresses the limitations and advantages of the most relevant and contentious proxies.

To my knowledge, this is the first attempt to identify sensible proxies to quantify the benefits of government contracting. Existing impact assessments have either been limited to single procurement rules or were focused on costs. For example, the RIA of the U.S. FAR was only focused on the fair pay and safe workplaces rule (U.S. Department of Defense et al., 2014) and the PWC Study concentrated on the costs of public procurement (PWC, 2011).

TABLE 4
BENEFIT MATRIX FOR PUBLIC PROCUREMENT LAW

Benefits (ends)	Principles (means)	Quantified Benefits (in numbers)	Monetized Benefits (in dollar amount)
Free market access	Competition	- Number of bids per tender - Number of lots per tender - Market concentration expressed in Herfindahl-Hirschman Index	- Reduced price (due to competition)
	Non-discrimination	- Number of contracts won by foreign suppliers - Appeal rate due to discrimination	- Lower prices offered by foreign suppliers - Avoided litigation costs
Best value for money	Procedural efficiency	- Hours spend to prepare offers (contractor) - Hours spent to evaluate offers (agency) - Number of contracts won by experienced contractors	- Costs saved in offer preparation (negotiated procedure) - Costs saved in offer evaluation (restricted and invitation procedures) - Cost saved through contracting with experienced contracts
	Project efficiency	- Number and volume of change orders - Number of days in default	- Costs saved by avoided change orders - Net present value (NPV) of timely delivery - Avoided liquidated damages for default
	Procedural quality	- Number of cancelled tenders (due to incomplete tender documents) - Appeal rate due to undue process (conflict of interest, right to be heard, etc.)	- Avoided cancellation costs - Avoided litigation costs
	Project quality	- Number of tenders with quality weighting higher than 50% - Number of lawsuits and damages for defective product	- WTP for high-quality project - Avoided litigation costs and damages
	Ecological sustainability	- Number of tenders requiring life-cycle costing - Number of tenders asking for sustainability weighting - Number of tenders requiring ecological standards/labels - Damages for destroyed infrastructure (i.e. acid rain)	- Costs saved due to life-cycle costing - WTP for sustainable project (e.g. higher train ticket prices for energy-efficient train) - Avoided damages to infrastructure

Benefits (ends)	Principles (means)	Quantified Benefits (in numbers)	Monetized Benefits (in dollar amount)
	Social sustainability	- Number of deaths due to unsafe and unhealthy working conditions	- Value of lives saved - Value of lives protected from illness and disability - Avoided liquidated damages for labor law violations
	Product innovation	- Number of variants per tender - Number of patents filed - Number of projects awarded in design contests - Number of projects that received design awards	- Costs saved through innovative variant - Value of patent - Prize money from contest/award
	Process innovation	- Number of e-auctions - Number of contracts awarded with dynamic purchasing systems (DPS) - Number of e-invoices	- Costs saved and price reduction per auction - Costs saved and price reduction with DPS - Costs saved per invoice
Good governance	Procedural transparency	- Number of information requests per tender (due to incomplete tender documents) - Number of contract (award) notices - Appeal rate due to lack of transparency	- Avoided litigation costs - Avoided costs to submit/answer information requests
	Equal treatment	- Appeal rate due to unequal treatment	- Avoided litigation costs
	Anti-corruption	- Number of red flags (see below) - Number of officials prosecuted or convicted for corruption - Budget leakage rate (difference btw. budget and actual costs)	- Lost value of tainted/overpriced project - Fine or monetary equivalent for imprisonment
	Non-collusion	- Number of prosecuted bid-rigging cases	- Value of damages - Value of fines

Limitations to Competition in Public Procurement

It is common knowledge that competition usually leads to lower prices. A useful measure for competition is the number of competitors, also expressed in the form of market concentration (see Hirschman-Herfindahl index or HHI). In public procurement, most studies rely on the number of bids to measure competition (Bajari, McMillan, & Tadelis, 2009, p. 390; Chong, Staropoli, & Yvrande-Billon, 2013, p. 64). But a larger number of bids does not always mean more effective competition. In some markets, even a small number of competitors who compete aggressively can create effective competition (Jaeger, 1997, pp. 441-466; Stobbe, 1991). For that reason, it is always advisable for the buyer to conduct a thorough market analysis to better understand the competitive structure of the market. Different than in traditional auctions, where the seller aims to increase the price of the product, procurement is a buy-sided market, where the buyer tries to buy for the lowest price. This reverse constellation poses some idiosyncratic challenges.

First, unlike buyers, sellers have *private information*. Manelli and Vincent found that when sellers are privately informed about the quality of the good to be sold, sealed bidding typically results in the

provision of the lowest quality object (Manelli & Vincent, 1992). To overcome this problem, the authors suggest to invite potential suppliers and to tender take-it-or-leave-it offers to each sequentially (Manelli & Vincent, 1992). In public procurement, this procedure comes closest to the invitation procedure (see Section 0) where the agency invites a limited number of qualified contractors and awards the contract to the lowest bidder ("EU PPD," 2014 Article 29 and 65; "U.S. FAR," 1984 Section 15.1).

Second, competitive bidding often involves the *risk of collusion* among competitors (Klemperer, 2002, p. 170). In Switzerland, most of the cartels detected over the past ten years occurred in the of public construction sector where the suppliers were agreeing on the winning bidder, fixing a higher bid price and applying a rotation scheme (Krummenacher, 2018). In a highway construction case, the Swiss Competition Authority (Wettbewerbskommission) was able to empirically show that during the period of the cartel the prices were at a constant higher level than market prices ("Strassenbeläge Tessin," 2008). In the case of collusion, competitive bidding may actually increase the prices.

Third, while sealed-bid auctions are the preferred mechanism to purchase standardized products, this does not necessarily hold true for the procurement of *complex projects*. Usually complex projects such as construction projects cannot be divided into standardized units with standardized characteristics based on which the price bidding takes place. In an empirical study, Bajari et. al showed that complex construction projects are more likely to be negotiated (Bajari et al., 2009, p. 388). The explanation is that complex projects often lead to *ex post* adaptations because they are less predictable.

Fourth, auctioned one-off projects may result in *less innovation* than negotiated long-term contracts (Calzolari, Felli, Koenen, Spagnolo, & Stahl, 2017). The reasons are twofold: idiosyncratic investments, and exclusive rights (Williamson, 1979, p. 234). To guarantee for investment and innovation, most procurement laws allow negotiated procedures for long-term contracts with continuous supply ("EU PPD," 2014 Article 32(3)(b); "Swiss PPO," 1995 Article 13(f)), and contracts with IP rights ("EU PPD," 2014 Article 32(2)(b)(iii); "Swiss PPO," 1995 Article 13(c)). Hence, due to their long-term character, negotiated contracts can increase the incentive to innovate and invest.

Transaction Costs as Major Inefficiency

When purchasing goods and works two categories of costs can be distinguished: production costs and transaction costs. Production cost is the price minus a profit margin. Since production costs are reflected in the purchase price, they are more salient in public procurement. Transaction costs, however, are often neglected, but play a very important role. Transaction cost is a cost that occurs when making a trade (Williamson, 1979). They can be divided into three broad categories: (1) search and information costs, (2) bargaining and decision costs, and (3) policing and enforcement costs (Dahlman, 1979). I will discuss them in more detail in the context of public procurement.

Search and information costs: When tendering a project, the procuring agency incurs search and information costs. The agency not only needs to conduct a market analysis, it also needs to find and evaluate the bidders. Open competitive bidding is often the most expensive because the agency needs to evaluate the largest number of bids. A 2006 study on Swiss procurement contracts found that the total average costs for evaluating offers in public auctions amounts to CHF 50,000-100,000 and the total average costs of preparing the offers costs suppliers over CHF 200,000 (Jaeger, 2006, pp. 40-44). While these costs make up 20% of the contract price for larger projects, they can reach 50% for smaller projects (Jaeger, 2006, p. 43). These are considerable costs that cannot be neglected.

Bargaining and decision costs: Even in public auctions, considerable bargaining costs can accumulate—most importantly in the form of *ex post* adaptation costs. *Ex post* adaptation costs are costs that occur as a consequence of project changes. Change orders are very common in construction projects and can be traced back to incomplete contract design. *Ex post* adaptation can either be measured by means of cost overruns that is the difference between the award price and the final price. Bajari et al. have estimated these costs to account for 7-14% of the winning bid (Bajari, Houghton, & Tadelis, 2014). Another way to measure *ex post* adaptations is by measuring the delay. To monetize delays, economic studies calculate the internal rate of return of the original project (e.g. 10% for road projects), the lifespan of the project (e.g. 25 years for road projects), and the discount rate (e.g. 5%) to adjust for the net present

value (NPV) (PWC, 2013, pp. 168-170). Finally, adaptation costs may also result from third-party opportunism, that are expressed in the form of challenges from competitors, interest groups or political opponents (Moszoro & Spiller, 2012). Moszoro and Spiller found that more rigid public contracts (such as fix price contracts) increase the need for *ex post* adaptations—costs that are ultimately born by the public at large (Moszoro & Spiller, 2012). Due to the lack of flexibility in procurement design and implementation and the associated adaptation costs, public contracts are often considered inefficient.

Policing and enforcement costs: In public procurement, enforcement costs occur at two instances: either the agency is facing bid protests for violations of procurement rules, or the government is injured by the company through delayed or defective performance. Most public procurement laws allow competitors to challenge an award when public procurement rules were violated. For example, the U.S. Competition in Contract Act (CICA) of 1984 allows disappointed bidders or offerors to protest to the Government Accountability Office (GAO) about an alleged violation of procurement regulation by a federal agency ("CICA," 1984 Section 3551(1)). In Switzerland, competitors can appeal a contract award to the Swiss Federal Administration Court (Bundesverwaltungsgericht) for a violation of law. In Swiss procurement law, the most common grounds of appeal are unequal treatment during the bid evaluation, a lack of transparency in the award criteria, or formal violations like the agency's omission to give reasons or conflict of interests of the agency (Huser, 2008). Analyzing the Court's case law shows that the Court upholds most agency decisions (85%). The second major enforcement costs occur when the project is delayed or defective. In most procurement regimes, defaults or delays are punished by means of liquidated damages (Swiss Federal Procurement Conference, 2016 Article 10; "U.S. FAR," 1984 Section 52.211). In the Swiss General Terms and Conditions for the Procurement of Goods, these damages are set at 10% of the contract price, but not exceeding CHF 100'000 (Swiss Federal Procurement Conference, 2016). Product defects are often covered through warranties (Swiss Federal Procurement Conference, 2016 Article 12; "U.S. FAR," 1984 Section 46.7). However, these need to be recovered by going to court, which is often expensive and therefore rare.

Measuring Quality, Sustainability and Innovation

Different than for the purchase price, there is no market mechanism to price *quality*. For the purpose of this Article, I define quality as the project quality, including innovation, and ecological and social sustainability. The challenge with quality is to find proxies that best reflect its value.

The two most common methods to evaluate non-marketable goods are stated preference studies, which rely on people's willingness to pay, and revealed preference studies. For instance, to measure the quality of a new highway one can interview car-owners about their willingness to pay for an increase in highway quality, such as less grooves and potholes. Such stated preference studies have the advantage that they directly answer the relevant question. However, the key weakness of contingent valuation studies is the hypothetical bias, namely when the reported WTP exceeds what the individual would actually pay with his or her own money (U.S. Environmental Protection Agency, 2014 Sections 7-18 - 7-20). The alternative method is revealed preference studies, such as hedonic pricing, where a product's quality components are quantified separately. Hedonic pricing is often used to evaluate real estate prices or in wage-risk studies (U.S. Environmental Protection Agency, 2014 Sections 7-21 - 7-31). For example, the acceptance of higher toll fees could reveal people's preferences for using a high versus low-quality highway.

To evaluate *ecological sustainability*, the Clean Air Act CBA asked people about their willingness to pay for a national park with increased visibility (U.S. Environmental Protection Agency, 2011). Similarly, to evaluate sustainability in the context of public procurement, one could interview consumers about their willingness to pay for an energy-efficient train. Alternatively, one could apply revealed preference studies, where consumers reveal their preference by paying higher ticket prices for an energy-efficient train than for a traditional train. To measure *social sustainability* or safety and health of workers, an often-used measure is the value of statistical life (VSL). The quantified benefit of a safe and healthy workplace can be expressed in the number of lives saved. The EPA was one of the early agencies that started valuing lives, based on people's WTP for reduced mortality risk, and conducting wage-risk

studies, which estimate the value of life based on risk premiums for riskier jobs (U.S. Environmental Protection Agency, 2011 Section 5-22). The EPA Guidelines describe the value of statistical life as “a summary measure for the dollar value of small changes in mortality risk experienced by a large number of people” (U.S. Environmental Protection Agency, 2014 Section XV). Currently, the EPA estimates the mean value of statistical life at \$7.4 million (in 2006\$) (U.S. Environmental Protection Agency, 2014 Section 5-18). The Department of Transportation departs from a higher VSL of \$9.6 million (U.S. Department of Transportation, 2016). Other, related measures are the quality-adjusted life-year (QALY) and disability-adjusted life-year (DALY). Both measures account for lower life expectancy due to illness and injury. The QALY was invented in the 1970’s and has become an internationally recognized tool for estimating life expectancy in the health sector (Sassi, 2006). The DALY is an alternative tool, which emerged in the early 1990’s as a means of quantifying the burden of disease (Sassi, 2006).

Measuring innovation is another challenging task. Innovation in public procurement, and in many other fields, can be distinguished in two broad categories: product innovation and process innovation. *Product innovation* are innovations that improve the quality of the product. The EU Public Procurement Directives mention eco-innovation and social innovation as two forms (“EU PPD,” 2014 Recital 47). One example is an innovative building that makes better use of space and energy. The most commonly used metric to measure product innovation is the number of patents filed and the company’s R&D budget (Stebbins, 2018). However, often public projects will not be innovative enough to reach the threshold of novelty (at least in Europe). For that reason, I suggest an alternative measure to evaluate innovation: the number of variants submitted to each tender. In public procurement, offerors are allowed to submit innovative variants that improve the project, such as more efficient use of space or less emissions. *Process innovation* on the other hand, is often not visible to the consumer and targets cost improvements. Hence, it is closely related to the goal of procedural efficiency. In public procurement, process innovation aims to improving the procurement process. One innovation to save costs and time is electronic procurement or e-procurement. E-procurement can be measured either by the cost savings or by the reduction in price (Eakin, 2003; Rambøll, 2004).

Measuring Corruption in Public Procurement

Anti-corruption concerns in public procurement are a development of the 21st century. Most scholars understand corruption as a cost (Dal Bo & Rossi, 2007; OECD, 2013, p. 1; Salinas-Jiménez & Salinas-Jiménez, 2007, p. 914). A well-known instrument to measure corruption is the Corruption Perceptions Index, developed by Transparency International (Transparency International, 2018). Despite its universal acceptance, the Index has two major flaws: first, the Index relies on people’s perceptions and not objective data, and second, the Index only collects one data point per country (Hough, 2017). To create more objective measurements, new indicators have been developed over the last few years (Escresa & Picci, 2017; Mungiu-Pippidi & Dadasov, 2016).

One measure that has been suggested is the number of convictions and prosecutions for corruption (Goel & Nelson, 1998). This measure has been criticized as a mere indicator for the functioning of the judiciary system and missing the dark figure of crime (Balsevich & Podkolzina, 2014, p. 7; Lambsdorff, 2005, p. 1). The more resources a country invests into the detection of crime, the higher the number of prosecutions and convictions will be. While this criticism is very valid in a cross-country study, the quality of the judicial system and the dark figure of crime has less impact when comparing the number of crimes in one country, across times and agencies.

Another method that has been suggested are the public expenditure tracking surveys (PETS). PETS follow the flow of budgets. More specifically, they detect leakage in public expenditures to identify corrupt activities. PETS compare the allocated budget with the value of awarded projects. Differences in amounts give an indication for potentially corrupt activities (Stromseth, Malesky, & Gueorguiev, 2017). However, project-specific budgetary information is often not publicly available and identifying the budgetary flows becomes a time-consuming task.

Finally, big and open data has allowed the emergence of a new method: red flag reports, which flag potentially corrupt activities. One prominent study in this field is the PWC Study on Identifying and

Reducing Corruption in Public Procurement in the EU (PWC, 2013, p. 155). It defined 27 red flags specifically tailored to detecting corruption in public procurement. Another similar approach is Fazekas and Kocsis' paper on Cross-National Corruption Proxies Using Government Contracting Data (Fazekas & Kocsis, 2015). They have developed the following six red flags:

1. Call for tender publication (0=call, 1=no call)
2. Procurement type (0=open, 1= non-open, including restricted and negotiated procedure)
3. Length of advertisement period (number of days between publication and submission deadline)
4. Weight of quality criteria (sum of weights of non-price criteria)
5. Length of decision period (number of days between submission and contract award)
6. Single bidder contract (0=more than 1 bid, 1=1 bid received)

While the red flag reports are more objective and specifically designed to measure corruption in the public procurement context, I see three issues. First, some flags highlight project categories that are very common and not suspect in public procurement. For example, tenders for complex construction projects often have a higher quality weighting than standardized purchases, and because the requirements are so unique, only a few specialized suppliers bid. As a consequence, the agency may choose a restricted procedure to limit its costs and receive only one bid. Such construction projects often make up 50% or more of all government contracts and would automatically be flagged. Second, some proxies listed above measure the same thing several times and thereby assign too much weight to these flags. For example, small repeated maintenance projects are often awarded using the negotiated procedure (red flag 2) with one bidder (red flag 6) and need not be publicly tendered (red flag 1). Such micro projects make up another large part of government contracts and would be automatically flagged. Finally, the flag identifying contracts with a high quality weighting (red flag 4) is counterproductive to recent political and legal efforts to promote quality and sustainability in public procurement.

Considering the drawbacks of perception-based indices, the dark figure of crime, and the data-intense work to detect leakage in expenditures, the most sensible method to measure corruption in procurement are still the red flag reports. However, for red flags to be sensitive indicators, they need to be specifically tailored to the type of project (complex or standard) and to the respective sector (construction, IT, defense, etc.). As so often, one size doesn't fit all.

A DECISION MATRIX FOR PUBLIC PROCUREMENT LAW

Where benefits cannot be sensibly monetized or a regulation needs to meet more than one goal, multiple-objective decision-making provides for a good alternative. Based on this idea, I have designed a decision matrix that is tailored to measure the potential of different procurement procedures to meet the different public procurement goals. This Part will give an overview of the decision matrix's structure and provide a critical appraisal.

Structure and Scope of the Decision Matrix

This Section suggests a decision matrix to evaluate the goal achievement of different procurement procedures (see Table 5) and lists the five steps to evaluate the different procedures: (1) Defining the legal options that will be compared (here the four procurement procedures); (2) Weighting the different procurement goals; (3) Rating the legal options with regard to their potential to achieve defined procurement goals; (4) Assessing and quantifying each legal option; and (5) Identifying the preferred legal option based on the assessment.

TABLE 5
DECISION MATRIX FOR COMPLEX PUBLIC CONSTRUCTION PROJECTS

Goals	1. Free market access (2 points)	2. Best value for money (6 points)	3. Good governance (2 points)	Sum
<i>Principles</i>	- <i>Competition</i> - <i>Non-discrimination</i>	- <i>Cost-efficiency</i> - <i>Quality</i> - <i>Sustainability</i> - <i>Innovation</i>	- <i>Transparency & equal treatment</i> - <i>Anti-corruption & non-collusion</i>	
1. Open procedure	High	Medium	High	24
2. Restricted procedure	Medium	Low	Medium	14
3. Invitation procedure	Medium	High	Medium	26
4. Negotiated procedure	Medium	High	Low	24

Rate of goal achievement: Low = 1, medium = 2, high = 3

Because public procurement projects are very different, and can vary in terms of sector and complexity, the decision matrix and especially the weighting of goals can vary significantly. Since the hierarchy and importance of goals is not specified in the procurement laws, assigning the weights to different procurement goals is an important policy decision that should be taken by a high government official, such as the agency head. For example, for a complex construction project the criteria of quality and innovation may be more important than for a standardized paper purchase. Cost-efficiency and price competition on the other hand, may be more important for standardized purchases than for tailor-made projects. For illustration purposes of the benefit matrix, I have chosen the hypothetical case of a complex public construction project.

Object of Comparison: Procurement Procedures

As outlined above, all assessment methods need a baseline. Instead of comparing regulation versus non-regulation (as most CBAs in the U.S.) or regulatory option A versus regulatory option B (as done in the EU Procurement Impact Assessment 2011), this decision matrix is designed to compare different procurement procedures. The choice of the award procedure is a crucial element of the procurement process. It decides whether or not the tender is publicly solicited, which firms are allowed to participate, and which procedural rights are given to bidders that were not considered. Most jurisdictions, including the U.S. and the EU, know four main procurement procedures, which are compared in the decision matrix and briefly summarized here:

1. **Open procedure** (in the U.S. called sealed bidding) allows every economic operator to submit a tender in response to a call for competition ("EU PPD," 2014 Article 27; "U.S. FAR," 1984 Section 14.1).
2. **Restricted procedure** (in the U.S. called the two-step sealed bidding) is a two-step procedure where first, any economic operator may submit a request to participate in response to a call for competition, and second, only the selected suppliers may submit a bid ("EU PPD," 2014 Article 28; "U.S. FAR," 1984 Section 14.5).
3. **Invitation procedure** (in the U.S. called competitive acquisitions and in the EU competitive procedure with negotiation) is a procedure where the procuring officer invites and negotiates with different suppliers ("EU PPD," 2014 Article 29 and 65; "U.S. FAR," 1984 Section 15.002).

4. **Negotiated procedure** (in the U.S. known as single/sole sourcing and in the EU as negotiated procedure without prior publication) is a procedure where the procuring officer directly awards the contract to a supplier without prior publication ("EU PPD," 2014 Article 32; "U.S. FAR," 1984 Section 15.002).

In the following decision matrix, these four procurement procedures will be compared against each other with regard to their potential to meet the defined public procurement goals.

Decision Criteria: Weighted Goals

The second step is to weigh the different procurement goals as to their importance. As mentioned earlier, the importance of procurement goals is a policy decision that is best taken by the agency head, and that may vary depending on the sector and the complexity of the project.

Achieving the *best value for money* is a central, if not the most important goal in most national procurement regimes. Procuring agencies have to purchase within budgetary limits to save taxpayers' money. Due to its importance, the goal of best value for money is weighted the highest (6 out of total 10 points). This weighting is derived from the importance of the underlying principles. For complex construction projects, efficiency and quality are weighted equally high (each 2 points), and sustainability and innovation with 1 point each to respect the recent developments. For standardized projects, the price will have a higher weight than quality.

Free market access is a product of trade liberalization and non-discrimination between national and foreign suppliers is crucial in international and regional settings. Non-discrimination in the national context is often important for complex projects that attract many foreign suppliers. For that reason, non-discrimination is weighted with 1 point. Competition is a crucial goal in government purchasing. But for complex projects competition will often be more limited than for standardized goods because only few suppliers can meet the requirements. For that reason, competition is weighted with 1 point. For standardized projects, competition may be weighted even higher. In sum, the goal of free market access is given 2 points.

Good governance entails the traditional principles of transparency and equal treatment, and the newer concerns of anti-corruption and non-collusion. I argue that transparency and anti-corruption concerns are even more important for complex projects since they often have large economic consequences and are observed more closely by the public. For that reason, good governance is given 2 points in total, the same weight as free market access. But taking into account the current political aspirations, it could be that the goal of good governance will soon outweigh the importance of free market access.

Rating: On the Basis of Quantified Benefits

The third step is the key element of the decision matrix and measures the potential of each procurement procedure to achieve the respective public procurement goal. In a real-life case, this rating process would be based on the quantitative results of the benefit matrix. The benefit matrix helps reveal which procurement procedure achieves the most benefits based on the metrics defined above. But because the matrix is applied to a hypothetical case, the following rating will be illustrative only. To rate the goal achievement of each procedure, I chose a Likert scale with three categories (low/1—medium/2—high/3). Depending on the information from the benefit matrix, this scale can be further detailed and extended into more categories. Below is an illustration of the rating process for the open procedure (see Table 5):

1. **Free market access:** Since the open procedure allows all interested economic operators to submit a bid, there are no (procurement-related) market entry barriers, no limitations to competition, and no discrimination between foreign and national suppliers. Therefore, the potential of the open procedure to achieve free market access is rated "high/3."
2. **Best value for money:** Because the open procedure is open to any supplier, it is more costly than negotiated procedure, but less expensive than the restricted procedure, which requires prequalification and allows for more appeals (PWC, 2011, p. 80). There seems to be no major difference in quality or sustainability outcome for different procedures. However, more often than in other procedures, open procedures ask for variants that allow for innovative solutions.

Considering all these aspects, the achievement of best value for money through the open procedure can be rated as “medium/2.”

3. **Good governance:** The open procedure is the most transparent procedure. It not only requires a call for competition, but also the publication of award notices. This allows each supplier to submit a bid, which in turn guarantees for more equal treatment among suppliers than the negotiated procedure. Also, the openness of the procedure allows for the necessary scrutiny to minimize corrupt behavior. Thus, the open procedure does well in achieving good governance and is rated “high/3.”

Assessment: A Simple Arithmetical Problem

To assess how well each procurement procedure achieves each procurement goal is a simple arithmetical problem. We simply multiply the weighted goal (G) with each procedure’s rating (R). This process can be expressed in a simple formula.

$$\pi = G * R \quad (1)$$

For example, the open procedure’s potential to achieve market access was rated high (R=3) and the goal of free market access was weighted with 2 points (G=2). If we multiply these two values, we get the product $\pi = 6$.

To estimate the open procedure’s potential to achieve all three procurement goals, we simply sum up the values for each goal and procedure. This calculation can be expressed in a simple formula, where i is the index of summation (the matrix fields), a is an indexed variable (specific field), m is the lower bound of summation (first field), and n is the upper bound of summation (last field).

$$\sum_{i=m}^n a_m = a_m + a_{m+1} + \dots + a_n \quad (2)$$

For example, if we sum up the value of the open procedure in achieving free market access (6 points), value for money (12 points) and good governance (6 points), we get the sum $\Sigma = 24$. This process needs to be repeated for each procedure (or policy option) until each procedure shows a final sum (Table 5, final column).

Identification of the Preferred Option

The last step in the decision matrix is the comparison of results and identification of the preferred option. In the illustrative decision matrix—again the results are for a hypothetical case—, the *invitation procedure* scores the highest and can be identified as the preferred option.

While the invitation procedure shows equally high scores for free market access and good governance, the score for best value for money is higher—equally high as for the negotiated procedure. The driving force behind the high value for money is the invitation procedure’s high cost-efficiency as compared to the open and restricted procedure. When comparing the invitation procedure with the *open procedure* in the matrix, the invitation procedure shows lower scores for free market access and good governance. The open procedure has the largest potential in achieving full competition and transparency—arguably the two strongest arguments in favor of the open procedure. In the illustrative decision matrix, the *restricted procedure* scores the lowest. The procedure shows a particularly low score for best value for money. As studies have shown, the restricted procedure is very costly, even more costly than the open procedure, due to the two-step selection process (European Commission, 2011). The two evaluation steps not only create more effort for the agency but also open the gateway for more appeals. Another observation from the illustrative decision matrix is that the open and the *negotiated procedure* show the same final scores. While the open procedure does score well in terms of free market access and good, the negotiated procedure performs particularly well in terms of best value for money. The negotiated procedure not only limits the costs involved, but also allows the agency to take into account local sustainability labels.

The identification of the preferred option aims to inform and provide a more objective basis for policy decisions, rather than binding the decision makers to the result. This optional approach goes in line with the European idea for regulatory impact assessments and differs from the U.S. approach where regulations are obliged to pass the cost-benefit test to be promulgated. In the European system, the Regulatory Scrutiny Board suggests a preferable policy option to the European Commission, which will often follow the Board's recommendations, but is not bound by it. One reason for the different treatment may be that the RIAs in the EU are usually performed for primary legislation like statutes that set the law's general direction, while in the U.S. CBAs are conducted for secondary legislation like administrative regulations that are executing statutes. Since primary legislations have greater importance, making the passing of RIAs optional leaves the ultimate control in the hands of the legislator while giving the executive some say.

Critical Appraisal of the Benefit Matrix

This Section highlights the advantages of a decision matrix over no evaluation method and over existing assessment methods for public procurement regulation.

First, the benefit matrix *creates transparency* on the weighting of different goals, but also on the underlying rating mechanism. Based on the decision matrix, agencies and legislators can lead an informed discussion about the potential of each procedure to achieve the defined procurement goals. As a result, decision makers can challenge and adjust the underlying assessment mechanism, the weighting of goals and principles in a transparent manner. Eventually, the decision matrix can serve as a guiding instrument for courts when deciding a case and balancing the different procurement goals.

Second, when the decision matrix is informed by real-life data, it has the potential to *reveal preferences*. For example, similar to surveys conducted for the EU Procurement Impact Assessment, the matrix can reveal that agencies and contractors are preferring the open procedure over the restricted procedure due to excessive costs. Also, the decision matrix can reveal that for complex projects the benefits of the negotiated procedure outweigh the benefits of other procedures, both from an agency and business perspective. This might suggest giving the negotiated procedure more weight when awarding complex projects.

Third, the benefit matrix gives decision makers an instrument to *compare different alternatives* and decide for the most optimal option. In practice, the majority of public contracts are awarded through the open procedure—mainly due to mandatory regulation (European Commission, 2011). In the illustrative decision matrix for the complex construction project, the invitation procedure yields the highest score. This might suggest using the invitation procedure as the new default procedure for complex projects. As stated earlier, the preferred option does not replace the agency's decision but can inform the decision-making process.

Fourth, the decision matrix provides for a *more objective benchmark* for decision makers. Compared to the situation of not having an economic analysis of law, which invites subjective and heterogeneous decisions, the decision matrix offers a data-driven approach to evaluate the different procurement procedures. Compared to the EU Procurement Impact Assessment and the PWC Study, this decision matrix does not only rely on qualitative interviews but is ultimately informed by quantified and monetized benefits.

Lastly, compared to existing regulatory impact assessments in the EU and U.S., the here designed decision matrix *compares specific legal instruments*, rather than high-level policy options. The decision matrix does not evaluate regulation versus non-regulation or regulatory option A versus regulatory option B but is designed to compare different procurement procedures. Rather than having a high-level policy debate about flexible versus strict procedures (as discussed in the EU Procurement Impact Assessment), the decision matrix will provide detailed insights about the benefits of each procedure, based on data.

By suggesting a more economic and quantitative approach to procurement regulation, which allows for better comparability of regulatory instruments, the decision matrix gives procuring agencies, regulators and courts a structured approach to weigh the different goals and instruments and to reach a better-informed, transparent decision.

CONCLUSION

Why: Measuring the economic effects of public procurement law allows decision makers to reach a well-informed, data-driven and objective decision on how to apply different procedures and procurement goals. Taking a more economic approach is all the more justified for economic regulations, such as procurement law, which follows the budgetary principles of efficiency and economy.

What: The starting point of each analysis is the definition of the decision criteria against which the regulation or regulatory options shall be measured. This Article has disentangled the different goals and principles of government purchasing and aimed at defining three overarching goals of national public procurement regimes that include free market access, best value for money, and good governance.

How: To measure the effects of regulations on the economy, many jurisdictions apply economic methods, such as regulatory cost-benefit analyses—with the U.S. taking a leading role. While each method offers pros and cons, this Article suggests two novel frameworks to measure the economic effects of government contracting and its procurement procedures. The Article first designs a *benefit matrix*, which defines the economic benefits of public procurement regulation and identifies metrics for quantifying and monetizing the different benefits. While the benefit matrix suggests a set of different proxies to quantify the benefits, monetizing non-marketable benefits such as quality or sustainability remain difficult. The second framework, *the decision matrix*, takes this limitation into account and offers a less quantitative approach that allows for more judgement. The framework provides decision makers with a structured approach to reach a more objective and well-informed policy decision on how to weigh the different procurement goals and which procedure to apply for different project types. The two methods are not mutually exclusive but can be applied in combination to inform each other: the benefit matrix can inform the normative discussion of the decision matrix with quantified and monetized benefits of the different procurement procedures and their potential to achieve the different procurement goals.

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