2020 Research report

Cost Overrun and Procurement Competence in Sweden

Giancarlo Spagnolo

SNS

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Print: Books on Demand, Germany
ISBN 978-91-88637-36-9

CONTENTS

ACKNOWLEDGMENTS

I would like to thank Theo Nyreröd for excellent research assistance, and Mats Bergman, Therese Lind, Jan-Eric Nilsson, Johan Nystrom, and Gustav Peldán Carlsson for many useful comments.

Giancarlo Spagnolo

Preface

IN THIS REPORT Giancarlo Spagnolo, professor in economics at Stockholm Institute of Transition Economics and former Head of Research at the Italian Central Procurement Agency (Consip Spa), provides a thorough review of the academic literature relating to public procurement and cost overrun. Of key significance is the link between procurement outcomes – prices, quality, cost overruns, innovation – and the competence of the purchasing authority. He provides an overview of the latest research as well as providing policy advice on how public procurment can be improved in Sweden.

The report is part of SNS research program, Sustainable Urban and Rural Planning. The project aims to provide knowledge in regard to how the built environment can be improved given society's changing demographics, urbanization, and rapid technological improvements. Focus areas include: transport, housing and energy. Public procurement is key in each of these sectors in order to economize with taxpayer money. SNS hope that the report will inform the public debate on procurement and cost overruns and offer valuable input for decision makers. The author is solely responsible for the analysis, conclusions and policy advice presented in the report. SNS as an organization does not take a position on any of the perspectives offered by the review. The mission for SNS is to initiate and present research-based analyses of important societal issues.

The project has been made possible through the contributions of a reference group that also follows the research project. This group consists of Boverket, Byggföretagen, E.ON., Einar Mattsson, Ellevio, Infrastrukturdepartementet, Installatörsföretagen, Jernhusen, JM, Kommuninvest, Länsförsäkringars forskningsfond, Nacka kommun, Newsec, Ramboll, Region Stockholm, Sjunde AP-fonden, Skandia, Svenska Byggnadsarbetareförbundet, Svenskt Näringsliv, Trafikverket, Transport-

företagen, Tågföretagen, White Arkitekter och Volvo Bussar. Robert Lundmark, professor in economics at Luleå University of Technology, is the representative of the SNS Scientific Council in the reference group and Kerstin Gillsbro, CEO of Jernhusen, is the group's chairman. The author has received valuable input and comments on earlier drafts of the report from the members of the reference group.

At an academic seminar, Johan Nyström, researcher at Nyfou and affiliated researcher at Real Estate Science, Lund University, and Jan-Eric Nilsson, professor at Swedish National Road and Transport Research Institute provided constructive comments on the report.

The summary of the report has been translated to Swedish by Theo Nyreröd in collaboration with SNS.

Stockholm May 2020

Thérèse Lind
Research director, SNS

Swedish Summary / Svensk sammanfattning

OFFENTLIGA UPPHANDLINGAR UTGÖR i genomsnitt 15 procent av BNP i utvecklade ekonomier och andelen ökar. Att genomföra upphandlingar är en nyckelfunktion inom offentlig sektor, och hur väl man lyckas med upphandlingarna påverkar både kvaliteten och den mängd varor som det offentliga kan tillhandahålla. I Sverige har klagomålen om kostnadsöverskridanden och andra misslyckanden inom offentlig upphandling ökat under de senaste åren. Denna rapport syftar till att bidra till samhällsdebatten med kunskap om vad som enligt ekonomisk forskning är de mest troliga orsakerna till, och de mest effektiva åtgärderna mot, dessa misslyckanden. Ett huvudfokus i rapporten är kopplingen mellan upphandlingsresultat – det vill säga pris, kvalitet, kostnadsöverskridande, innovation – och den upphandlande myndighetens kompetens, något som belysts i aktuell forskning. Därefter ges konkreta rekommendationer om hur upphandlingskompetensen kan förbättras och upprätthållas i Sverige.

Offentlig upphandling är komplext, särskilt när det gäller stora infrastrukturprojekt. Förutom juridisk expertis så kräver *effektiv* upphandling relativt avancerad kunskap inom teknik, strategi och förhandling, ekonomi, finans och projektledning. Trots dess komplexitet betraktas offentlig upphandling i flera länder, inklusive Sverige, många gånger som en administrativ funktion som kan överlåtas till administrativa och byråkratiska regler. Detta är ett vanligt men mycket kostsamt misstag. Akademisk forskning visar att samtidigt som lagen följs till punkt och pricka kan dåligt utförda upphandlingar kosta två procent av BNP årligen i termer av bortkastade skattepengar. Dåligt utförda upphandlingar kan dessutom resultera i betydligt lägre kvalitet i de varor och tjänster som tillhandahålls av det offentliga än vad som hade varit fallet om upphandlingarna genomförts på ett bättre sätt. Detta är potentiellt sett ett ännu större problem än de direkta kostnaderna eftersom

vissa av dessa varor och tjänster är avgörande för långsiktig ekonomisk tillväxt.

Inledningsvis diskuteras i rapporten några nyligen omdebatterade fall av påstådda misslyckanden inom offentlig upphandling i Sverige, som framför allt är relaterade till kostnadsöverskridanden. För att sätta dessa i perspektiv jämförs de med liknande fall i andra länder. Sedan görs en genomgång av såväl etablerad som ny forskning om kostnadsöverskridanden i stora infrastrukturprojekt, underleverans när det gäller kvalitet, avancerade lösningar såsom ryktesbaserade mekanismer samt vikten av upphandlingskompetens för utformning och implementering av dessa lösningar. Slutligen beskrivs de kompetensramverk som vissa länder har infört för att skapa och upprätthålla upphandlingskompetensen inom den offentliga förvaltningen. Avslutningsvis ges rekommendationer om de viktigaste målen som rapportförfattaren anser att den svenska regeringen bör fokusera på.

Slutsatser från fallstudier

De fall av kostnadsöverskridanden som undersökts i Sverige och utomlands antyder att:

- Debatten om Nya Karolinska Solna (NKS), som föranledde denna rapport, kretsade framför allt kring kostnadsöverskridanden. Men tillgängliga data är bristfälliga, vilket gör det omöjligt att på ett adekvat sätt bedöma den nuvarande omfattningen av kostnadsöverskridande för detta projekt. Mot bakgrund av den lilla mängd information som finns, och jämfört med andra liknande fall, verkar emellertid den nuvarande omfattningen av kostnadsöverskridande inte ovanligt hög. Detta utesluter naturligtvis inte att priset kan ha varit för högt eller designen undermålig, som vissa observatörer har hävdat, eller att kostnadsöverskridandet kan öka i framtiden på grund av höga anpassningskostnader.
- Den upphandlingsprocess som följdes för NKS var ganska förvirrad och oprofessionell, då konsultföretag (kända för att ha egna agendor) användes på ett oförsiktigt sätt. Men processen illustrerar också en tydlig brist på kompetens från den offentliga sidan, vilket är mycket problematiskt för offentlig-privat samverkan (OPS). OPS är ett upphandlingsverktyg som är välkänt för att kräva högkvalificerade, ofta statliga, tekniska enheter för att vara effektivt, framför allt givet att konkurrensen om dessa projekt typiskt sett är låg. Arlanda Express, ett tidigare svenskt OPS-projekt som hanterades av ett mycket skickligt team på den offentliga sidan, genererade inte stora tids- eller kostnadsöverskridanden och följdes inte heller av betydande kritik i media.
- Andra aktuella och omdiskuterade exempel på upphandlingsbrister i Sverige indikerar att underleverans av kvalitet

kan vara ett lika stort problem som kostnadsöverskridanden. Detta problem kan också knytas till brist på upphandlingskompetens när det gäller anbudsdesign och management.

Slutsatser från forskningsgenomgång

Litteraturen om kostnadsöverskridanden och andra former av omförhandling visar bland annat att:

- Metoder för hur man ska beräkna kostnadsöverskridanden skiljer sig kraftigt åt och vissa kontraktstyper är så ofullständiga och flexibla till sin natur att även om data och etablerade beräkningsmetoder skulle finnas tillgängliga kvarstår problematiken kring mätning av kostnadsöverskridanden.
- Ekonomisk teori gör tydligt att det kan finnas många skäl att omförhandla ett kontrakt. Vissa kan vara bra i bemärkelsen att de är effektivitetshöjande, till exempel om en omförhandling utlösts av svårförutsägbara händelser. Andra kan i stället leda till stor ineffektivitet. För att möjliggöra en meningsfull debatt om kostnadsöverskridanden är det därför helt väsentligt att skilja på »bra« och »dåliga« omförhandlingar, även om det kan vara utmanande.
- I de flesta dokumenterade fallen bedöms kostnadsöverskridanden som »dåliga«. Det gäller i synnerhet om de orsakas av att en leverantör lägger ett (orimligt) lågt bud med förväntan om att det kommer att vara möjligt att bilateralt förhandla upp priset efter att kontraktet är vunnet.
- »Dåliga« kostnadsöverskridanden är vanligtvis kopplade till en oförmåga hos offentliga köpare att utforma poängregler och relaterade kontraktsbestämmelser för att skydda sig mot opportunistiskt låga bud.

Att mäta leverantörers tidigare prestationer är ett sätt att undvika kostnadsöverskridanden. Företag med en historia av att inte slutföra projekt inom ramen för det avtalade priset kan då på ett enklare sätt uteslutas från framtida projekt. Ny forskning om dessa mekanismer belyser att:

- Problem med kvaliteten som levereras, som sällan mäts, och säkerhetsaspekter på entreprenörernas arbetsplatser kan vara av ännu större betydelse än kostnadsöverskridanden.
- Kompetent utformade ryktesmekanismer, baserade på effektivt insamlad och strukturerad prestationsdata från tidigare projekt, förbättrar upphandlad kvalitet och säkerhet på arbetsplatser utan att öka upphandlingspriset. Samma metod skulle därför även kunna vara effektiv mot kostnadsöverskridanden.
- Om dessa ryktesmekanismer är dåligt utformade eller hanteras felaktigt kan de utesluta små eller nya företag från marknaderna för offentlig upphandling. När de däremot är

kompetent utformade kan de i stället både förbättra prestationen och öka inträdet av små och nya företag.

Den akademiska litteraturen om inköpares kompetens inom offentlig upphandling är fortfarande i sin linda, men den har redan gett viktiga resultat. Nya studier som använder amerikanska, italienska och ryska data har funnit kausala samband som visar att:

- Förbättrad kompetens och minskad byråkrati vid offentlig upphandling kan öka dess effektivitet och årligen spara upp till två procent av BNP, tack vare lägre priser på standardiserade varor.
- Både den enskilda upphandlaren och inköpsorganisationen spelar stor roll, cirka 40 procent av variationen i kvalitetsjusterade priser på standardiserade varor avgörs av organisation och inköpare tillsammans. Enskilda upphandlare kan i sin tur tillskrivas ungefär hälften av den variationen medan inköpsorganisationen kan tillskrivas den andra hälften.
- För komplexa tjänster och arbeten leder kompetensförbättring med en standardavvikelse till att antalet förseningar minskar med 23 procent, kostnadsöverskridanden minskar med 29 procent och antalet omförhandlingar halveras.

Utforma ett kompetensramverk

Sammantaget visar de forskningsresultat som presenteras i rapporten att kompetens i dess många former är avgörande för effektiv offentlig upphandling. Detta gäller oavsett om det är förmågan att förstå betydelsen av bra data och hur den kan användas på lämpligt sätt, redogöra för *optimism bias* i kostnadsberäkningar för att undvika kostnadsöverskridande eller förmågan att använda ryktesmekanismer för att undvika att välja undermåliga leverantörer. OECD och EU har sedan 2015 publicerat rapporter och rekommendationer om vikten av att öka kompetensen inom offentlig upphandling. Dessa rekommendationer får stöd av de forskningsresultat som framkommit de senaste åren och som beskrivs i rapporten. Erfarenheterna från länder som USA och Storbritannien, och några nya initiativ i Italien, indikerar att det krävs ett enhetligt ramverk för att förbättra upphandlingskompetensen, vilket omfattar att:

- Skapa utbildningscenter och utbildningsprogram på mastersnivå, där avancerad upphandlingskompetens kan erhållas.
- Ackreditera innehållet och kvaliteten i dessa program. Det skulle göra det möjligt för offentliga förvaltningar att vara säkra på vilken kompetens nuvarande och blivande anställda har tillägnat sig.
- Ge incitament till studenter och tjänstemän att gå dessa

program, i form av karriärutveckling och högre löner. Denna typ av incitament är också nödvändiga för att behålla behöriga upphandlare i den offentliga sektorn – upphandlingskompetenser är även mycket efterfrågade i den privata sektorn.

› Samla in och dokumentera data om alla aspekter av offentliga upphandlingar på ett rigoröst sätt. Utan data är det omöjligt att mäta upphandlingsprestation och därför även omöjligt att belöna bra och kompetent upphandling – och undvika att belöna undermålig upphandling.

Rekommendationer för Sverige

För Sveriges del finns det mycket att vinna på ökad kompetens inom offentlig upphandling, vilket många tidigare nationella rapporter redan har betonat. Sverige verkar för närvarande sakna alla delar som ingår i ett framgångsrikt ramverk för upphandling: avancerade utbildningsprogram, certifiering av färdigheter i offentlig upphandling, den data som är nödvändig för att utvärdera kompetenta och effektiva upphandlingar (på organisatorisk och individuell nivå) samt incitamentsstrukturer baserade på sådana utvärderingar.

Rapportförfattarens rekommendationer är därför att Sverige, för att begränsa slöseri med skattebetalarnas pengar och förbättra kvaliteten på offentliga varor och infrastruktur, snarast bör införa åtgärder som leder till:

1. Skapandet av mastersprogram (eller motsvarande) i upphandlingshantering som inkluderar specifika inslag om offentlig upphandling. I länder som USA finns det gott om mastersprogram som är dedikerade till de strategiska, ekonomiska och förvaltningsrelaterade aspekterna av offentlig upphandling utöver det rent juridiska. Sverige har inga jämförbara utbildningar. Mot bakgrund av detta bör Sverige överväga samordning mellan offentliga köpare, forskare, akademiska institutioner och relevanta myndigheter, till exempel Upphandlingsmyndigheten, för att utveckla en grundläggande läroplan för ett mastersprogram i offentlig upphandling. Till exempel bör institutioner som Stockholms universitet och Kungliga Tekniska högskolan (KTH) ha tvärvetenskapliga resurser för att sätta ihop ett mastersprogram av hög kvalitet. KTH kan vara särskilt lämpligt, eftersom de för närvarande har en kurs i hantering av leverantörskedjor som täcker flera viktiga delar såsom val och utvärdering av leverantörer, resultatåtgärder, e-inköp och leverantörskedjerelaterade kontrakt. Vidare ligger ett av Statens väg- och transportforskningsinstituts (VTI) kontor på KTH:s campus. Att använda kurser som redan ges för upphandling inom privat sektor kan också vara en bra utgångspunkt.

2. Ackreditering av dessa mastersprogram av en lämplig institution så att certifierade examina erkänns av arbetsgivare vid både anställning och befordran. Många länder, inklusive USA, har certifieringsstrukturer för offentliga upphandlare. För att bli certifierade måste offentliga upphandlare slutföra ackrediterade program. När de får mer erfarenhet kan de ansöka om certifiering på högre nivå. Sverige har ingen jämförbar certifieringsstruktur för offentliga upphandlare. Därför bör Sverige överväga att ge mandat till en lämplig institution (till exempel Upphandlingsmyndigheten) att ackreditera mastersprogram i offentlig upphandling.
3. Tydliga karriärvägar (till exempel snabbare befordran, högre löner) för studenter och tjänstemän som utför specialiserade studier i offentlig upphandling. Att ha en certifierad examen i avancerad offentlig upphandling bör vara en betydande fördel när personer söker jobb inom offentlig upphandling. I Storbritannien och USA är de som saknar lämplig certifiering inte berättigade till mer krävande positioner inom offentlig upphandling.
4. Förbättrade data och transparens. I slående kontrast till de detaljerade registeruppgifter som finns om privatpersoner har Sverige mycket bristfälliga uppgifter om offentlig upphandling, både på efterfråge- och utbudssidan, även om detta kan förändras i och med antagandet av lagstiftningsförslaget om att förbättra upphandlingsstatistiken (Prop. 2018/19:142). Adekvata data är avgörande för att förbättra effektiviteten i offentlig upphandling av flera skäl. För det första, för att förstå hur allvarliga problem som till exempel kostnadsöverskridanden är, måste uppgifter om projektets ursprungliga och slutliga pris vara tillgängliga. För det andra, för att använda verktyg som ryktesmekanismer, måste data om leverantörernas prestanda samlas in efterhand. För det tredje är det nödvändigt att mäta prestationen bland offentliga upphandlare för att belöna kompetenta och effektiva upphandlare och inte minst för att undvika att belöna ineffektiva upphandlare.

Data och kompetens är därför förutsättningar för att kunna använda många av de verktyg som behövs för att förbättra effektiviteten i offentlig upphandling. Om mängden upphandlingar och upphandlingarnas komplexitet fortsätter att öka, samtidigt som inga investeringar görs i förbättrad kompetens, kommer alla problem som diskuteras i denna rapport att förvärras.

Executive Summary

PUBLIC PROCUREMENT CONSTITUTES on average 15% of developed economies' GDP and is on the rise. It is a core function of governments that directly affects the amount and quality of public goods they can provide. In Sweden, complaints about cost overruns and other public procurement failures have been mounting in recent years. This report aims at informing the policy debate on what economic research suggests are the most likely causes and most effective remedies for these failures. A main focus will be the connection established by recent research between procurement outcomes – prices, quality, cost overruns, innovation – and the competence of the purchasing authority. This will be followed by practical recommendations on how to improve and sustain the level of procurement competence in the Swedish context.

Public procurement is a complex activity, especially in the case of large infrastructure projects. In addition to legal expertise, *effective* procurement requires rather advanced engineering, strategic, economic, financial, and project management skills. Nonetheless, despite its complexity, in many countries, including Sweden, public procurement is still largely viewed as a merely administrative function, one that can be left to rigid administrative laws and bureaucratic rules. This is a common and very costly mistake: academic research shows that while fully respecting the law, poorly performed procurement may cost 2% of GDP per year in terms of wasted taxpayers' money and can potentially lead to even more important deficits in the quality of government-provided goods and services, some of which are crucial to long-term economic growth.

Beginning with a discussion of some recently debated episodes of alleged public procurement failures in Sweden, in particular due to cost overruns, we first look at comparable cases abroad to put the Swedish cases into perspective. We then survey different strands of both established and recent

research on cost overruns in large infrastructure projects, quality underprovision, advanced solutions in terms of reputation-based mechanisms, and the importance of procurement competence for the design and implementation of these solutions. Finally, we describe the frameworks that some other countries have put into place to create and sustain these competences in public administration, concluding with recommendations on the key milestones we believe the Swedish government should focus upon. A summary of the main conclusions is given below.

Conclusions from the analysis of case studies

The examples we considered and the comparison with analogous cases abroad suggest that:

- The debate on Nya Karolinska Solna that triggered this report focused on cost overrun, but available data are poor, making it impossible to properly assess the current extent of cost overrun. However, in light of the little information available, and compared with analogous cases elsewhere, the current extent of cost overrun does not appear to be unusually high. This does not exclude, of course, that the price may have been too high or the design poor, as some observers have argued, nor that the cost overrun may increase in the future because of high adaptation costs.
- The process followed for this project was rather confused and unprofessional, with consulting firms known to have clear agendas being used in incautious ways, and a clear lack of competences on the public side, which is highly problematic for Public Private Partnerships (PPPs), a procurement tool well known for requiring highly skilled government technical units to be effective, given that competition is typically scarce. Arlanda Express, a previous Swedish PPP project managed by a highly skilled team on the public side did not generate major time or cost overruns, nor attract significant media criticism.
- Other highly debated recent examples of procurement failures in Sweden indicate that quality underprovision may be as big a problem as cost overruns, and may also be traced to a lack of procurement competence in terms of tender design and management.

Conclusions from surveys of academic research

The literature on cost overruns and other forms of renegotiation in procurement indicates, among other things, that:

- Practices used to calculate cost overruns vary wildly and some contract types are incomplete and flexible to the extent that even if data and agreed methods are available measuring cost overrun becomes problematic.
- Theory explains that there may be many reasons to renegotiate, some efficiency-enhancing, such as renegotiation triggered by hard-to-foresee contingencies, and some highly inefficient. Consequently, distinguishing between 'good' and 'bad' renegotiations is challenging but essential to a meaningful debate on cost overruns.
- In the majority of documented cases cost overruns are assessed as 'bad', especially if they are initiated by a low bidding supplier that expects to renegotiate the price upwards in bilateral negotiations after winning the contract.
- Bad cost overruns are typically linked to the inability of public buyers to competently design scoring rules and related contractual provisions to protect themselves from these opportunistic 'low balling' bids.

Measuring the past performance of suppliers is one possible way to avoid cost overruns by excluding firms with a history of failing to complete projects within the contracted price. Recent research on these mechanisms highlights that:

- Rarely measured problems of underprovision of procured quality, and of safety at contractors' work sites, can be even more impactful than problems of cost overrun.
- Competently designed reputation systems based on effectively collected and structured past performance data significantly improve procured quality and safety at work sites without increasing procurement price, suggesting that this may also be the case with cost overrun.
- If poorly designed or managed, these mechanisms may exclude small or new firms from public procurement markets; when competently designed they can instead both improve procurement performance and increase entry by small and new firms.

The academic literature on buyers' competence in public procurement is still in its infancy, but it has already produced important results. Using US, Italian, and Russian data, recent studies have obtained causal evidence that:

- Improving competence and reducing red tape in public procurement can increase its effectiveness and save up to 2% of GDP annually in terms of lower prices of standardized goods.
- About 40% of the variation in quality-adjusted prices of standardized goods is attributable to the procurers managing the processes like individual procurement officers and the public organizations using and paying for the goods. Roughly half of that variation can, in turn, be attributetd

to the individual procureres and the other half to the organizations.
› For complex services and works, a one standard deviation improvement in competence reduces the number of delays by 23%, cost overruns by 29%, and renegotiations by half.

Building a Competence Framework

Taken together, the research results summarized above indicate that competence in its many forms – whether it be the ability to recognize the importance of data and use it appropriately, account for optimism bias in cost estimations to avoid cost overruns, or the ability to use and design tools such as past performance mechanisms to avoid selecting poorly performing suppliers – is essential in order to ensure effective public procurement. Since 2015, the OECD and the EU have issued reports and recommendations on the importance of increasing competence in public procurement. The prudence of these recommendations has been bolstered by the academic evidence summarized above. Reviewing the experiences of countries like the US and the UK, and some new initiatives taking place in Italy, suggests that a consistent framework needs to be developed to enhance procurement competence, including:

› Creation of training centres and programs, such as master's-level courses, where advanced procurement competences can be obtained.
› Certification of the content and quality of these programs that allow public administrations to be sure about the competence of current and prospective employees.
› Incentives for graduate students and civil servants to undertake these programs, in terms of career advancement and higher wages. Such incentives are also necessary to retain competent procurers in the public sector, as procurement competences are also highly valued in the private sector.
› Extensive and careful data collection on all aspects of public procurement, as without data it is impossible to measure procurement performance, and therefore to reward good, competent performance and to not award poor performance.

Recommendations for Sweden

As for Sweden, we find that the scope for increasing competence in public procurement is extensive – as many previous national reports have already emphasized. Sweden currently appears to lack all elements of a successful procurement competence framework: advanced training programs, certification of skills in public procurement, the data necessary to evaluate

competent and effective procurement (at the organizational and individual level), and the incentive structures based on such measures.

Our recommendations are therefore that, in order to limit the waste of taxpayers' money and improve the quality of public goods and infrastructure, Sweden should urgently introduce policies that induce:

1. The creation of master's (or analogous) programs in procurement management that include the specificities of public procurement. In countries like the US, there are plenty of master's programs dedicated to the strategic, economic, and management aspects of public procurement in addition to the legal ones. However, currently, Sweden has no comparable educational programs. In light of this, Sweden should consider coordinating with public buyers, researchers, academic departments, and relevant agencies such as Upphandlingsmyndigheten to develop a core curriculum for a master's programme in public procurement. For example, institutions such as Stockholm University and Kungliga Tekniska Högskolan (KTH) should have the interdisciplinary resources to put together a master's programme of high quality. KTH may be particularly suitable, as they currently offer a course in supply chain management that covers several important topics such as supplier selection and evaluation, performance measures, E-purchasing, and supply chain-related contracts. Furthermore, one of Statens väg- och transportforskningsinstitut's (VTI) offices is located on the KTH campus. Utilizing courses already taught for procurement in the private sector may also be a good starting point.
2. Accreditation of these master's programs by a suitable institution, so that certified degrees can be recognized by purchasing agencies at the hiring or promotion stages. Many countries, including the US, have certification structures for public procurers. To obtain these certifications, public procurers must complete accredited programs. As they gain more experience, they can apply for higher level certifications. Sweden has no comparable certification structure for public procurers. Therefore, Sweden should consider providing a mandate to a suitable institution (e.g. Upphandlingsmyndigheten) to accredit master's programs in public procurement.
3. Clear career paths (e.g. faster promotion, higher wages) for prospective students or current civil servants undertaking specialized studies in public procurement. Acquiring a certified degree in advanced public procurement should be a significant advantage when applying for jobs in public procurement. In the UK and US, those without the appropriate certification are ineligible for more demanding positions in public procurement.

4. Improved data and transparency. In striking contrast to the detailed data on individuals, Sweden has very poor data on public procurement, on both the demand and supply side, although this may soon change due to the passing of a legislative proposal to improve procurement statistics (Prop. 2018/19:142). Adequate data is necessary to improve the effectiveness of public procurement for a number of reasons. First, to understand the severity of issues like cost overruns, data on the initial and final price of the project need to be available. Second, to utilize tools like past-performance mechanisms, data need to be collected ex post on the performance of suppliers. Third, in order to reward competent and effective public procurers, and to avoid rewarding poor and ineffective procurement, it is necessary to measure the performance of public procurers.

Data and competence are therefore prerequisites for using many tools to improve public procurement effectiveness, such as past performance mechanisms. If the amount of procurement and its complexity continues to grow then, unless there is an urgent investment in competence, all the problems discussed in this report will worsen.

1. Introduction

PUBLIC PROCUREMENT – government's purchase of goods and services from private contractors – accounts for around 15% of GDP in most economies (WTO, 2015) and is on the rise. In Sweden, the value of public procurements corresponds to about one-sixth of GDP, constituting a market with a value of 683 billion SEK annually (Upphandlingsmyndigheten, 2018: 3).

The efficiency of the procurement process directly influences the quality of many government-provided goods and services that are crucial to social welfare objectives and sustained economic growth. The recent corona virus crisis has highlighted the fundamental importance of effective public procurement in healthcare and emergencies.[1] Several issues challenge this efficiency, however. This report focuses on wasteful cost overruns, particularly in large projects; on the lack of competence of public sector buyers that is often the source behind them; and on what can be done to reduce such waste, particularly in Sweden.

Public procurement is a complex activity that – while respecting legal requirements – can be performed poorly or well. Public buyers must identify their needs, design and manage the award mechanism, balance risks and incentives in the contract, and monitor the contractor and manage the contract in the often long and complex execution phase. Performing these tasks effectively requires an understanding of product and market characteristics and dynamics, strategic abilities to design the tender and negotiate and manage the contracts, and therefore knowledge from different fields such as economics, law, engineering, and project management (Dimitri et al., 2006).

Even while respecting legal rules, poor procurement can lead to large wastes of public money. Bandiera et al. (2009), in one of the most rigorous studies on public procurement,

1. Poor quality of face masks and other recently purchased safety equipment has been an issue in several countries. In Sweden, face masks with deficient quality recently had to be recalled after having been distributed to 13 regions. This crisis is also likely to initiate a broader debate on healthcare and emergency procurement, but also the resilience of supply chains.

exploit the centralization of Italian procurement as a quasi-experiment and estimate, among other things (see Section 4 for additional details), that competent and effective public procurement of goods and services can save between 1.4 and 2.1% of GDP every year: Italian public buyers would save 21% of their expenditures on goods and services, 8% of Italy's GDP, if they all paid the same as buyers at the 10th percentile of the estimated procurement price distribution. If these results are transferable to the Swedish case – which our and others' analyses (discussed in Section 6) – suggest they should, Sweden could potentially save several billion SEK each year if public procurement competence could be improved.[2] Conversely, these numbers suggest that in countries without an advanced system to create and sustain high levels of procurement competence in the public administration, the lack of competence is likely to waste of taxpayer money in the range of 1.4–2.1% of GDP every year just in the procurement of goods and services.[3]

To this estimate one should add the waste from the procurement of works and other complex projects, like the Nya Karolinska Solna (NKS) hospital, that typically lead to cost overruns and are therefore at the centre of this report. Precisely because of their complexity, the monetary cost of public sector incompetence is likely higher for these projects. The additional use of complex procurement tools, like Public Private Partnerships (PPPs), which require teams of highly skilled specialists within the public sector to avoid huge transfers of taxpayer money to private contractors and consulting firms (PPPs typically generate little competition between contractors that could prevent them), can further increase the risk of wasting taxpayer money.

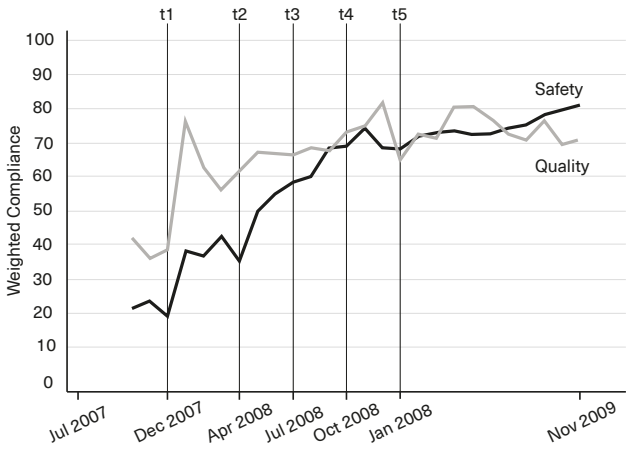
While we have been asked to focus on cost overruns, it should be kept in mind that, even absent price increases and cost overruns, incompetently run procurement can dramatically reduce the quality of provided public goods, services, or works. To have an idea of the size of the potential waste from 'quality underrun', consider another academic study by Decarolis et al. (2016). This paper studies a public utility subject to public procurement regulations for special sectors that with our direct support experimentally introduced a reputational mechanism that rewarded good past performance with higher probability of receiving new contracts. Its main finding is that compliance with work quality and safety requirements went up from about 25% to above 80% thanks to the introduction of the reputational mechanism (see Figure 1 below), while procurement prices did not change.

The study illustrates that competent procurement practices can generate much higher quality and safety of procured services at almost no additional cost for the buyer and thus the taxpayer. Conversely, it suggests that poor procurement design and management may imply an enormous loss of po-

2. According to a back-of-the-envelope calculation in an EU Staff Working Document (2015 202: 61), extrapolating from the study by Bandiera et al. (2009), the estimated potential economic gains from solving problems of procurement professionalization amounts to more than €80 billion in the EU.

3. A recent paper by Nilsson et al. (2019b) focuses on Sweden, studying road surface renewal contracts tendered by Trafikverket between 2012 and 2015. It finds that if the performance of the least efficient engineer matched that of the best, costs could be reduced by 32%; and if all engineers matched the efficiency performance of the top performers, total costs for resurfacing in Sweden could be reduced by around 20%. This would save around €40 million per year from Sweden's annual road resurfacing budget of €200 million.

Figure 1. Increased compliance after experiment.
Source: Decarolis et al. (2016). Audits data. Monthly average compliance calculated separately for Safety and Quality on all parameters inspected in the month of reference, weighting each parameter by its weight in the Reputation Index (RI). The vertical lines identify each date upon which the introduction of the reputational system was announced to suppliers: t1 is the date when the management of the public utility firm (together with us) announced to suppliers that it would soon start employing such a reputational mechanism. At dates t2–t5, we updated contractors on the forthcoming award rule change and disclosed how compliance with the 136 quality and work safety parameters contributing to the past performance score was evolving across all the contractors audited.



tential quality and work safety, even in the absence of cost overruns.

Unfortunately, in many countries procurement is still considered a mere administrative function rather than a profession, ensuring that these major possible efficiency gains go unrealized. For example, Saussier and Tirole (2015: 11) note that according to a study by the French Public Procurement Grouping Union, only 39% of public buyers in France undertook any course or training resulting in qualification in the field of purchasing, and according to a recent report, 35% of OECD countries do not recognize procurement as a profession (OECD, 2016: 47).

Until recent decades, a similar situation was present in the private sector: procurement was considered a strategic activity like production, sales, or research and development (R&D).

It was considered a very easy task: buyers have the money, and hence suppliers will just run to them to sell. Things changed considerably after Toyota conquered a large percentage of the automobile markets mainly because of the high quality of products linked to their novel procurement strategies. Toyota's US market share went from around 3% in 1974 to around 18% in 2009, while between 1980 and 2009 General Motors' (GM) US market share fell from 46% to 20%, and the firm went bankrupt in 2009 (Helper and Handerson, 2014: 49). Although the decline of GM was caused by a variety of factors, an important aspect was that its contracting methods were adversarial, in comparison to Toyota who excelled at relational contracts with their suppliers.

The recognition of the importance and complexity of public procurement, and of the large monetary and quality gains and losses it can generate for taxpayers, has only emerged recently, together with an increased reliance on public procurement for public goods provision, rather than in-house state production. Sweden also undertook a considerable shift in the provision of government services from in-house production to procurement from private contractors (Bergman and Nilsson, 2012). However, to our knowledge, this process was not accompanied by adequate training programs in public procurement for those administrators in charge of the process, nor with the certification structure and regulation to establish public procurement as a profession with proper incentives and career paths. This, together with the endemic lack of data on procurement transactions and outcomes that are essential to provide the incentives noted in previous reports (Bobilev et al., 2015), led to our assessment in Sections 6 and 7 that the situation in Sweden is hardly better than elsewhere in Europe, and therefore that substantial savings in waste and improvements in quality could be obtained by improving the public procurement competence of Swedish contracting authorities.

Indeed, it appears that in Sweden there are currently very limited training opportunities in public procurement, and there is no robust framework to provide incentives to civil servants to acquire and sustain procurement competences (see Section 6.3). While a National Procurement Strategy (Regeringskansliet, 2016) has been adopted recently, partly as a response to an extensive 2013 report on the state of public procurement in Sweden by Statens Offentliga Utredningar (SOU), several key issues identified by SOU were not discussed in this strategy and have still not been addressed, at least to our knowledge. The SOU report notes that 'several of the problems and difficulties that this investigation has identified is directly connected to different questions regarding *competence*'[4] (SOU, 2013: 197, our emphasis). They further note that 'several firms have pointed out that the civil servants responsible for organizing and the execution of public procure-

4. 'Flera problem och svårigheter som Upphandlingsutredningen identifierat är direkt kopplade till olika kompetensfrågor'.

ment often have insufficient knowledge regarding the relevant market, and therefore lack the knowledge on the sortiments and price of goods'[5] (SOU, 2013: 198), and that 'all the consultive bodies [Remissinstanser] that replied believed that it was urgent to strengthen competence among those in administrations that are responsible for public procurement'[6] (SOU, 2013: 198). The SOU report concludes with recommendations to improve competence in public procurement by instituting three professorships in public procurement and additional research funding, among other proposals (SOU 2013: 24).

While the urgent need to improve procurement competence is acknowledged, the 2016 National Procurement Strategy omits crucial issues, i.e. how should such increased competence be created, which institutions will develop and teach these skills, and how will incentives to acquire and sustain competence be provided to induce students and civil servants to take these courses. In spite of the significant emphasis placed on competence in the SOU (2013) report, the current Swedish National Procurement Strategy (Regeringskansliet, 2016) mentions competence only on three occasions, for example claiming that 'in order to retain the right competence, it is necessary to provide continuous in-service training for employees'. However, there is no mention of certification for procurement professionals, clear career paths, master's programs in public procurement, or robust incentives. Countries like the US and UK, discussed in Section 6, have master's programs in public procurement, certifications with different levels corresponding to level of experience and competence, and clear career incentives for professional procurers with awards and higher wages for more competent procurers. To our knowledge (see Section 6), this is still to a large extent absent in Sweden.

This report focuses on cost overruns and their relation to lack of procurement competence. Indeed, 'bad' cost overruns are oftentimes traceable to the lack of competence of those managing public procurement. Poor design of the tenders can encourage lowball bids, which then explode into cost overruns. An inadequate understanding of the risks associated with the different procurement models, and a failure to compensate for optimism bias, can also lead to price underestimations and cost overruns. As will become clearer in what follows, competence is also important for several additional issues, such as contract management, quality underprovision, and work safety.

The rest of this report proceeds as follows. In Section 2 we consider some cases that have been the subject of much debate in Sweden, starting with Nya Karolinska Solna. We maintain that contrary to what many have argued, this project has not created a major problem of cost overrun until now, at least compared to other similar projects debated in the media. Yet,

5. 'I delbetänkandet konstaterades att många företag har påpekat att de tjänstemän som är ansvariga för att organisera och genomföra offentlig upphandling ofta har otillräckliga kunskaper rörande frågor om den aktuella marknaden och därmed vilket utbud som finns i form av produkter och priser. Samtidigt har även företagens kompetens att utforma anbud varit föremål för kritik'.

6. 'Samtliga remissinstanser som svarat ansåg att det vara angeläget att stärka kompetensen hos dem inom myndigheterna som är ansvariga för offentlig upphandling'.

the procurement process that was followed, together with the rather incautious use of consultants, suggests that there is ample room to improve public procurement competence within Swedish local and central governmental agencies. We also consider similar cases from abroad to illustrate the complexity of public procurement of large construction and infrastructure projects, how often this leads to significant cost overruns, and that competence can limit cost underestimation, a typical source of cost overruns, and related issues throughout the procurement process. The section ends with a discussion of additional highly debated recent cases of public procurement issues in Sweden that suggest, in line with previous expert opinions and reports, that public procurement competence in Sweden needs to be considerably improved.

In Section 3 we present an overview of existing research on cost overruns and other related forms of contract renegotiation in general and in particular for large infrastructure projects. We first consider the theoretical background on contract renegotiation – which always occurs in cases of cost overruns. We then review the academic literature on cost overruns in 'megaprojects' (usually defined as projects with costs exceeding $250 million), and in Public Private Partnerships, in comparison to cost overruns in traditionally procured projects. The section ends with a discussion of 'good' and 'bad' cost overruns and renegotiations embedded in a discussion of the wider extensive empirical literature on the causes and determinants of contract renegotiation and its effects on public procurement. Contract renegotiation, including toward higher costs, is sometimes desirable from the point of view of the public procurer, as new information can emerge during the project and adaptions may be needed to improve the final outcome. In certain cases, these cost overruns may then benefit taxpayers.

In Section 4 we discuss a less debated form of procurement failure, quality underprovision, that is not as visible and therefore more difficult to tackle, but that can be even more damaging than excessive prices or cost overrun. We discuss the use of 'reputational' or 'past performance' mechanisms, in which the past performance of firms is given weight in the tendering stage together with price and other aspects of the bid. Such mechanisms can be a good way to incentivize firms to provide higher quality, and also reduce 'lowball' bids. Cases in which the focus has been primarily on accepting the lowest bid can lead to quality issues, as some recent cases in Sweden appear to illustrate.

In Section 5 we review the recent academic evidence on the effects of public procurement competence, considering research from both the fields of economics and management science. In aggregate, these studies suggest that substantial

savings and increases in quality can be obtained by increasing competence in public procurement.

In Section 6 we examine how the US and UK develop and sustain competence in public procurement, and we also consider the situation with respect to competence in Sweden. We find that Sweden lacks comparable training opportunities, and in contrast to the US and UK, Sweden also lacks proper incentive structures and career pathways for public procurers.

In Section 7 we conclude with some recommendations. Our recommendations are in line with recommendations by the EU and OECD, and with several previous reports and expert opinions from within Sweden, who all stress the urgent need to develop public procurement competence within government agencies.

2. Cost Overruns and Procurement Failures: Examples from Sweden and Abroad

THERE ARE SEVERAL ANECDOTAL CASES that have been brought up in the media, often in a very negative way, that suggest a serious lack of public procurement competence and that major improvements are needed. We start by discussing at greater length the case of NKS, from which this report originates,[7] and then discuss more briefly a number of other cases abroad and in Sweden.

2.1 Nya Karolinska Solna

The procurement of NKS has been the subject of great controversy in Sweden – often linked to its high cost and sometimes poor functionality – although media coverage has often been inadequate and at times misleading.

In terms of cost overrun, at present the NKS case is not as bad as many have argued, at least compared to other internationally famous cases. As for construction, service, operation, and interest fees until 2040, Stockholms Läns Landsting (SLL) concluded at the time of the contract in 2010 that the cost would be 52 billion SEK (SLL, 2012: 4). In 2015 it was revealed by Svenska Dagbladet that the expected costs had increased to 61.4 billion (Mellgren and Ennart, 2015), but after SLL refinanced in 2018, the new cost was determined to be 57 billion. NKS, therefore, appears to have produced, until now, a relatively mild cost overrun given the size of the project.[8]

This, however, does not imply that this cost overrun will not increase in the future, nor that the price paid represented good value-for-money for the Swedish taxpayer. For NKS a Public-Private Partnership (PPP) was chosen, and when using the PPP model, the cost overrun calculated after only few years of a contract lasting several decades is not a good metric to look at. Moreover, if the budget is sufficiently large, any cost

7. This report originates with a talk given by the author at SNS on cost overrun and NKS.

8. This should be taken with a grain of salt. If other numbers are taken as the initial cost estimate, for example what SLL was willing to allocate to a new hospital early in the planning phase, then the cost overrun would be greater. Nor has any thorough follow-up on cost overrun in the NKS project been carried out, so the safer conclusion would be that we do not know how much of a cost overrun it has accumulated. However, given the public outrage at this project, we believe it is worth emphasizing that for the little we know, at the moment the project does not yet appear as bad as some observers have claimed when compared to analogous cases abroad.

overrun can be avoided at the cost of a large waste of taxpayer money. It is therefore important to look at the final, total cost of the hospital.[9]

The rationale for choosing the PPP model for NKS, according to the decision makers at the time, was to create predictability and security for society and taxpayers. The costs would be predetermined and create strong economic incentives for the project firm to complete it on time, given that pay-outs are conditional on the completion of different parts of the project. The risks for increased costs landed on the private partner rather than taxpayers (SLL, 2012: 3).

However, according to a recent report from Stockholm University (Junker and Yngfalk, 2018), two SLL investigations prior to 2006, 'SNUS-utredningen' (SLL, 2002) and '3 S-utredningen' (SLL, 2004), had concluded against the use of a PPP model for two salient reasons: that Sweden lacked experience and expertise to manage this particularly complex form of public procurement, and that there would not be enough competition to contain the risk of excessive prices (Junker and Yngfalk, in SU, 2018: 90). The PPP model has been very popular in the UK and South America because local authorities could not obtain loans on their own. This issue was not present in Sweden, and it has been reported that during educational trips to the UK for the SNUS-utredning 'none of the representatives for the British hospital projects could recommend continuing with a PPP solution in Sweden as the local authority had the opportunity to borrow money themselves'[10] (Junker and Yngfalk, in SU, 2018: 90).

Junker and Yngfalk, in SU (2018: 86) conclude that the change in the governing political constellation at SLL in 2006 appears to have been significant in the attitude shift toward the PPP model. This new leadership had PricewaterhouseCoopers (PwC), one of the consulting companies that earned the highest fees from its assistance in implementing and renegotiating PPPs around the world, conduct a new investigation which concluded in favour of the PPP model.[11] Not surprisingly, in light of previous experiences in other countries, fees for consulting services exploded afterwards, and for the period 2011–2017 amounted to 959 million SEK according to a recent report (Setterwalls, 2018: 7). Again unsurprisingly, the same consultancy that in 2006 argued that NKS was suitable for a PPP model was then hired by SLL in 2018 to consult on the renegotiation of the NKS contract (Mellgren, 2018).

At present, the opaque role played by consulting firms in relation to SLL appears the most problematic aspect of the NKS case. The massive amount of consultancy fees paid out for the NKS project and the manner in which consulting firms were hired suggest a lack of procurement competence on the public side, coupled with the conviction that this know-how, integral to counterbalance the private sector's informational

9. According to Mellgren and Ennart (2015), in 2010 a person at SLL asked McKinsey to evaluate the expected total cost of NKS, which was determined to be about 50% greater than other highly specialized hospitals in the Nordic countries, but this report was never made public. Another issue with the procurement of NKS was that there was only one bidder. During the pre-qualification phase, a total of 48 interested parties asked to have the application documents sent to them. The 15th of December 2008 was the last day to apply to become pre-qualified to enter the bidding phase. By that date, only one application for pre-qualification had been submitted (SLL, 2010: 85).

10. 'Ingen av representanterna för de brittiska sjukhusprojekten kunde rekommendera att gå vidare med en OPS-lösning i Sverige eftersom de svenska landstingen hade möjlighet att låna pengar själva' (Respondent 1).

11. A later investigation was then requested from Ernst and Young, but this time the question focused more on the execution of a PPP model rather than whether to adopt this model (Junker and Yngfalk, in SU, 2018: 96).

advantage and stronger ability to negotiate high prices could be purchased from consultants at a sufficiently high price.[12]

It is well known that part of the costs of lack of competence in PPPs often take the form of lawyer and external consultant fees, and there is an increased recognition that having professional procurers trained to implement projects effectively and efficiently is much less expensive than engaging private consultants. Timmins and Giles (2011) estimate that on all PFI deals in the UK 'consultants and lawyers have earned at least £2.8 billion and probably well over £4 billion advising on the deal', and this was in 2011. There may be alternative interests at play on the part of private consultants which should not be disregarded: for example, consultants often have past, present, and expected future business relations with private partners that create incentives for them to act more in their own interest rather than that of the public administration that hires them.[13]

If there were procurement issues with NKS, the most salient one appears to us to have to do with the lack of a competent unit in the public administration necessary to handle complex procurement tools like PPPs and to counteract both the pressure from private partners to negotiate high prices in the absence of competition and the way in which consulting firms have been (mis)used as a way to fill this gap. The process was unprofessional in our view because 1) no PPP technical unit existed in the government to properly evaluate the project; 2) consulting firms with private incentives to pursue PPPs were consulted on whether NKS was to be procured with the PPP model; 3) consulting fees were very high afterwards suggesting that, in the best of the cases, internal know-how was largely lacking.

There is, however, one case of an apparently successful PPP in Sweden that was neither overtime nor over budget: the Arlanda Express project. One partial explanation for this success appears to be the exceptionally skilled team that managed the procurement. The working group established by the government for this project was chaired by a retired business CEO and manned by officials who had been working with very complex contracting projects in the past (Nilsson et al., 2008: 79–80). A review of the project (Riksrevisionen, 2016) concludes that the complexity and scope of the contracts require high-level competence to match the negotiation capacities of the private sector. The report notes that it took a long time for the state representatives to develop the competence to match the private partners, but that the state representatives have the necessary competence, although they are dependent on key persons and external financial and judicial competence for their negotiation capacities. A more general conclusion of the report was to emphasise the difficulty of securing state-side competence.

12. For example, the average cost of a consultant from the Boston Consulting Group was 700,000 SEK per person, per month (Gustafsson and Röstlund, 2018).

13. This is a well-known form of conflict of interest faced by credit rating agencies thought to be one major cause behind the financial crisis of 2008 (see e.g. Bai, 2010). It is worth noting that, thanks to the Lux Leaks scandal, we know that PwC got a contract with Swedish Hospital Partners (the project-firm winner of the NKS contract) to setup an advance tax scheme in Luxemburg some months after they won the contract to build NKS.

While cost and time overruns can be partially managed by competent state-side representatives, the literature on cost overruns shows that they are frequent for complex large-scale projects.

2.2 Cost overruns abroad

Here we consider some cases of cost overrun in megaprojects worldwide to illustrate how large cost overruns and to substantiate our claim that until now, the cost overrun at NKS has been minor compared to similar projects. We then review some additional recent highly debated Swedish cases that suggest that public procurement competence is a serious issue in Sweden, and to show that in addition to megaprojects and cost overruns, attention should be paid to other issues than cost overrun, such as quality underprovision.

Several cases abroad have incurred far greater cost overruns than NKS. Consider, for example, the US Veterans Affairs (VA) hospital in Aurora, a suburb of Denver, Colorado. In 2006, VA hired a design team that in 2009 estimated it could build the hospital for $537 million and finish it by 2013. In November of 2011, project officials from VA were negotiating with executives from Kiewit-Turner, the construction firm selected to build the hospital. Kiewit-Turner had joined the project more than a year earlier with the expectation to finish the hospital by 2014 at a cost of $582.8 million. After pre-construction work, Kiewit-Turner executives had found that the project would be more expensive, costing around $604 million, even with cost-reducing design changes (Draper and Matthews, 2014). Kiewit-Turner then prevailed in a lawsuit against VA at the US Civilian Board of Contract Appeals, who determined that VA did not produce a design that could be built for $604 million, but that the project would exceed $1 billion in costs (Coffman, 2018). In 2018, the cost had ballooned from the initial estimate of $537 million to $1.73 billion.

The VA used a contracting method it had little experience with, known as 'integrated design and construct' – where architects and builders work together from the start – a method 'the private sector had used successfully to keep projects on time and within budget' (Olinger et al., 2015). A VA pre-construction project management plan from September 2011 listed 27 high risks, including cost overruns and an unfamiliar contracting method. The Government Accountability Office (GAO) was not happy with VA's approach to procuring medical facilities. In a report from 2013, they note that:

> For VA's four largest medical-facility construction projects, when comparing November 2012 construction project data with the cost and schedule estimates first submitted to

> Congress, cost increases ranged from 59 percent to 144 percent, representing a total cost increase of nearly $1.5 billion and an average increase of approximately $366 million per project. The schedule delays ranged from 14 to 74 months with an average delay of 35 months per project. (GAO 2013: 8)

The National Paediatric Hospital project in Ireland had similar cost overrun problems. The project was initiated in 2007, when the health minister appointed a hospital development board to oversee its development. The original budget for the project in 2013 was €790 million. First stage tenders were returned on 21 October 2016 and four bids had been submitted. The lowest bid was €637 million, a competitive bid received from the Dutch construction firm Royal BAM – €131 million lower than the second lowest bid (Joint Committee on Health Debate, 2019). In April of 2017 the government approved the Definitive Business Case (DBC), which identified the total cost to be €983 million for construction, equipment, and two satellite centres. By December of 2018 the estimated costs had increased by €450 million to €1.43 billion. A report by PwC (2019: 1) estimates that the current capital investment requirement for the project will land at €1.73 billion.

Tom Costello, chair of the development board for the hospital, was questioned in a joint committee debate on health issues at the Oireachtas, the legislature of Ireland, in January of 2019. Some causes of the cost overrun were identified by Costello: a failure to reach targeted savings (€40 million), statutory issues such as fire regulations put in place after the Grenfell Tower fire in the UK (€27 million), omissions in the design at the tender stage that were then brought into the final design during the design and development process (€20 million), and the nine-month extension of the programme and additional scope (€90 million) (Joint Committee on Health Debate, 2019). Many were unhappy about the cost overrun. For example, Deputy Stephen S. Donnelly stated that:

> I have looked at this in some detail and when it comes to the costs I believe that Mr. Costello and the board have failed completely and catastrophically in their job and their obligations to the State. […] When this is all done, I think the overspending will be somewhere between €1 billion and €1.5 billion – and it could be higher. (Joint Committee on Health Debate, 2019)[14]

Donnelly appears to have been partially correct: a PwC report concludes that €294 million (65%) of the cost increase can be attributed to issues that should have been identified prior to the approval of the definitive business case. This included the price of risk transferred to the subcontractor, which according

14. He went on to say 'If Mr. Costello was asked by a client to build a high-quality hotel that had to be cost-effective in terms of the capital used and he informed his client two years into the project that on the basis that inflation was high and he had underestimated the amount of bricks, wires, windows, beds and pipes needed, the client would have to pay twice as much for the new hotel as the most expensive hotel built anywhere in the world, he would be fired, his company would be taken off the contract and numerous court cases would be taken to find out what happened. I am trying to understand how we will end up spending twice as much per bed as the most expensive hospital ever built. How many of those involved in this project have lost their jobs to date and how many contracts, whether for quantity surveyors, mechanical and electrical works, building or site clearance, have been cancelled due to these cost escalations?' (Joint Committee on Health Debate, 2019).

to PwC was insufficiently priced, 'as well as costs that would have been absorbed by the inclusion of an allowance for optimism bias and a more appropriate level of contingency' (PwC, 2019: 5). The PwC report further notes that 'the understanding of the risk profile associated with the procurement and contracting strategy was poor at all levels of the governance structure' (PwC, 2019: 4). PwC also identifies issues with the procurement process, including that the four high bids should have been a warning sign that the budget was insufficient, and that the tender evaluation criteria for the main construction contract was heavily weighted towards price.[15]

Then there are other nightmare cases of cost overruns and delays. The construction of Brandenburg Airport in Germany started in October 2006 and the facility was scheduled to open in October 2011. The opening was postponed several times between 2011 and the present day, and it is currently expected to open on 31 October 2020. Presently, the funds needed to complete the airport will surpass €7.3 billion – exceeding the initial budget by €5.3 billion – while other reports anticipate that the total cost will land at over €10 billion (Metzner, 2018).

In all these megaprojects, poor public procurement management led to outcomes that could have been at least partially avoided. But poor procurement management can have severe consequences for the public in the context of non-megaprojects procurement as well, a topic we now get to.

2.3 Procurement issues in Sweden

Beyond cost overruns, recent cases discussed in the Swedish media suggest a costly lack of procurement expertise even among very large Swedish public buyers. Consider, for example, the recent incident when two of the largest contracts for the project Förbifart Stockholm – to build two tunnels at Lovön – were annulled by Trafikverket alleging that the contract had been breached due to a failure to meet acceptable working conditions at the sites (Trafikverket, 2019a). At that time, only around 14% of the works had been completed. The contractor, a consortium named Lovön Samverkan AB (LSAB) then filed for bankruptcy, which was granted by Solna Tingsrätt on 20 March 2019. The contracts now must be procured again, which will contribute to time delays, expected to be around four years, and cost overruns, expected to be around 3.3 billion SEK (Trafikverket, 2019b). In the second round of procurement, the last date for bid submission ended on 25 October 2019, but Trafikverket chose to cancel the new procurement and not give the go ahead to any of the bidders, due to a lack of qualified bids.

Even in the absence of US 'surety bonds' markets (Engel et al., 2006), European/Swedish procurers do have instru-

15. 'The tender competition for the main construction contract concluded in October 2016 and returned four bids, all of which were higher than the budget of €575m by a range of €61m–€239m. This should have served as a warning that the budget that had been developed – and had not yet been submitted for approval – was insufficient. Instead, however, a Value Engineering (VE) target of €70m was introduced following contract award, which had the effect of offsetting the increase and presenting the main construction contract as being within capital budget' (PwC, 2019: 23). The report further states: 'The tender evaluation criteria for the main construction contract was heavily weighted towards price. Of the 1,000 points that bidders could be awarded, 750 were based on price and the evaluation criteria were arranged such that the lowest priced bidder would secure all 750 points. This would inevitably encourage lean pricing and the tender responses should have therefore reinforced warning that the budget was insufficient and that achieving the VE target would be highly challenging. This had the potential to create commercial tension with Contractors from the beginning of the project' (PwC, 2019: 24).

ments to prevent obviously unrealistic 'lowball' offers. According to Swedish law, if a public buyer determines that a bid is abnormally low, they should ask for a justification of the bid from the firm. If that justification is deemed inadequate, then the public buyer should reject the bid. The issue of low bids in this context may, however, be a problem at the level of the courts. The general director of Trafikverket Lena Erixon, in an interview with Sveriges Radio in relation to Förbifart Stockholm, pointed out that they have pursued several bids in the past as speculative, but then lost the cases in court.[16] In general, it is hard to reject bids in Sweden, and economic inefficiency is not a sufficient reason to reject low bids, nor is abnormally low bids is not authoritatively defined in the national legislation (Ølykke and Nyström, 2018: 687, 705/706).

In the presence of incomplete/imperfect contracts with insufficient buyer protections, cost underestimation is *per se* a determinant of both cost overrun and the acceptance of abnormally low bids that lead to problems such as that of Förbifart Stockholm. Procurement procedures that focus mostly on the lowest price with limited protection from contractors' default creates incentives for suppliers to pursue strategies such as low-balling in the hope of later renegotiating the price upward (more on this in Section 3).

Another strategy is to cut every corner imaginable, which may result in a significant decrease in quality that can be difficult to monitor. An interesting case of this type apparently happened when Statistiska Centralbyrån (SCB), a government agency that releases annual reports on unemployment in Sweden, decided to outsource half of their interview data for their unemployment statistics. Media reports claim that the cost of interviews specified in the winning firm's bid (140 SEK per interview) was less than half of the cost SCB faces when administering interviews directly, and significantly lower than that of the other bidders (around 215 SEK per interview) (Eklund and Törnwall, 2019). The pressure to conduct interviews quickly and cheaply then allegedly led to the fabrication of interviews (Granlund, 2019a), and it appears that SCB knew about issues with the quality and reliability of the contractor's data collection processes as early as 2016 (Granlund, 2019b).

This kind of procurement mistake can cause severe issues for the broader public, and in this case may even have had an effect on macro-economic decisions. Based on the poor data provided by this firm it was officially reported, for example, that the unemployment rate was 7.1% in September of 2019. That number was incorrect, and later had to be corrected to 6% (Statistiska Centralbyrån, 2019). This had possible far reaching consequences. For example, recently the Swedish central bank was recently accused of waiting too long to increase interest rate, but one reason for this delay may have

16. 'In Sweden, a tender is abnormally low if there is a risk of nonperformance and if the explanations for the low pricing are general rather than specific. This means that only a risk of nonperformance is a legitimate reason for rejecting an abnormally low tender. Receiving strategically set prices is not, as such, a legal basis for the contracting authority to reject a tender as abnormally low. Hence, economic inefficiency is not a sufficient reason to reject low bids' (Ølykke and Nyström, 2018: 705–706).

been the incorrect perception of a higher unemployment rate linked to the procurement failure.

According to SCB's general director Joakim Stymne, the winning firm's bid was appealed and tried in court, and the procurement was done 'in accordance with all applicable rules'. This confirms our point that adherence to legal guidelines is no guarantee of good procurement outcomes: engineering, marketing, economic, strategic, and project management skills are essential to design and manage procurement effectively and to obtain good value for money.

In light of the concerns expressed by the director of Trafikverket about the inability to exclude low bids, this also suggests that there may be an issue with competence at the level of courts, or of the experts hired by the courts. There are, however, other means of avoiding poor quality than rejecting abnormally low bids, such as effectively structuring and enforcing contractual penalties, requiring larger bonds from the firm to be withheld if contractual obligations are not met (which disincentivizes low balling), and most importantly weighing the past performance of firms in addition to the bid price (more on this in Section 4).

Another dangerous procurement issue occurred recently when surgeries had to be put on hold at Akademiska Sjukhuset in Uppsala and at hospitals in several other parts of Sweden due to a failure of a supplier to deliver on time. Varuförsörningsnämden confirmed the contract with the new supplier to deliver hospital materials to five regions in Sweden, one of which was Region Uppsala. The bid of the new supplier was 14 million SEK lower than the previous one, but the new supplier failed to deliver the necessary goods on time. Dagens Medicin has surveyed the cancelled surgeries, and reports that in the total region affected by delivery issues, 480 surgeries had to be cancelled (Berglund, 2019).

In an opinion piece, Waluszewski and Håkansson (2019) argue that the 'savings' in Region Uppsala due to the lower price were certainly outweighed by the inability to deliver medical supplies. They also argue that quality needs to be considered especially in regard to low bids, and mention that leading figures in the profession had warned about the firm's lack of delivery capacity since 2013. The firm in turn alleges that they received inaccurate information on the storage status in the different regions and that this caused the faulty deliveries, requesting reimbursement from the regions affected for the additional costs they incurred.

The numerous procurement failures mentioned in this section (all of which occurred within the last year), where excessive weight was placed on price relative to quality, important past performance information was ignored, and abnormally low bids were accepted, together with the NKS case, in ag-

gregate suggest that there is a strong need to improve public procurement competence in Sweden, as is the case in many other countries.

The lack of procurement competence in Sweden is not a new issue, but has been identified in several reports and by multiple experts (Konkurrensverket, 2007; Bergman, 2013; SOU, 2013; Indén et al., 2014). Issues that stand in the way for developing and sustaining higher procurement competence include a lack of resources in smaller purchasing municipalities and the low status of the procurement profession in Sweden (Indén et al., 2014: 45). This report adds to the discussion in two ways: by highlighting recent academic research on the importance of public procurement competence in terms of cost efficiency and quality improvement, and by considering how to develop and sustain competence by looking at how this has been achieved in the UK and US, and is currently being pursued in other European countries.

3. A Brief Survey of Research on Cost Overruns

COST OVERRUN IS A FORM of procurement contract renegotiation where the costs of a project grow substantially beyond the initial estimates. The term been used for large price increase, i.e. independently of changes to a procured object that may have necessitated the higher cost. The issue has been discussed in particular for extremely large and unique public projects, sometimes called 'megaprojects', typically in construction (but also for military and space-related projects). These projects are characterized by (claims of) a high degree of complexity and novelty, in addition to unusual size, and often involve a massive increase in costs associated with long delays or 'time overrun'.[17]

We do not know a great deal about cost overruns in Sweden, mostly due to a lack of data (see Section 4.5). Some sources report that for large infrastructure projects in Sweden, cost overruns have been in the range of 100% or more for several high profile infrastructure projects.[18] Academic studies on infrastructure projects in Sweden document persistent cost overruns, but in the same order of magnitude as those in comparable countries, and in part they may be attributable to 'unit price' contracts where – precisely because of the large uncertainty – only the price per unit and a very rough estimate of their number/quantity are specified in advance. These contracts should be used only in very complex situations entailing great uncertainty precisely to leave buyers free to adapt the quantity bought to the need revealed by the information learned during the execution of the contract. Thus, a total expenditure greater than the initial estimate is more than natural. The abuse of these highly discretionary contracts, which exempt public buyers from properly estimating the required budget and shift procurement risk from contractors to taxpayers, may however be problematic.

In a study of rail and road projects in Sweden completed

17. One of the most classic examples is the Sydney Opera House: it was completed after a delay of ten years at a price 14.6 times what was initially budgeted.

18. See Öjemar, F. (2019). We have not been able to verify this information, however.

during 1997–2009, Lundberg et al. (2011) find that the average cost overrun for road projects is 11.1% while for rail it is 21.1% – with a high standard deviation of 50.5% for rail projects. Nilsson et al. (2019a) study a database of 776 contracts by Trafikverket for works in the road and railway projects. The database contains contracts for both investments and maintenance work in excess of 10 million SEK. They calculate that road project contracts have an 86% probability of cost overrun, and that railway contracts have a 94% probability of cost overrun. For road contracts, the average cost overrun is 20% higher than the agreed upon price, while for rails it is 32% more than the original contract price. Riksrevisionen (2019) concludes that contracts for operation and maintenance of roads by Trafikverket had an average cost overrun of more than 40%. Compared to some of the studies discussed in this section, this level of cost overrun does not come off as particularly severe.

In the remainder of this section, we briefly survey the small, mainly empirical literature on cost overruns and its determinants, and connect it to the more extensive related literatures on renegotiation. To set the stage for the empirical literature, we first discuss how economic theory has evolved in its view on procurement contract renegotiation and cost overruns.

3.1 Theory

It is worth noticing that contrary to the literature on megaprojects (discussed below), where cost overruns have an almost unanimously negative connotation, the theoretical literature on contract renegotiation and its application to procurement identifies a number of possibly virtuous effects of ex-post renegotiation, besides its many other negative ones.

Most prominently, renegotiation plays an essential productive role in the property rights theory pioneered by Grossman and Hart (1986) and Hart and Moore (1990), where the importance of unforeseen contingencies and contractual incompleteness was finally recognized. Since the states of nature change over the life of the contract in ways that are not always anticipated by the contracting parties, renegotiation (assumed to be costless) increases welfare by allowing parties to effectively adjust the agreement in light of contingencies revealed ex-post. However, the inability to not to renegotiate exposes parties to the risk of being 'held-up' in the ex-post bargaining phase, thereby possibly inducing underinvestment.[19] This led to further analyses of explicit 'renegotiation design', referring to the 'design of rules that govern the process of renegotiation' (Aghion et al., 1994). Most follow-up theories in this literature posit that the ability to renegotiate is an important aspect of contract design, conferring strategic flexibility

19. The old 'complete' contract theory, postulating costless complete contracting and perfect foresight and enforcement, paid little attention to renegotiation as everything could be anticipated and dealt with ex-ante.

to adjust the terms of trade ex-post to include contingencies not anticipated in the initial contract design.

Relatedly, Spulber (1990) studied procurement auctions in which the winning bidder may default on performance if information revealed after the auction results in cost overruns. Spulber focuses on the potential for bid pooling in a race to the bottom in which inefficient firms bid low in the expectation of performing only in the most favourable circumstances, forcing more efficient firms to do likewise. He notes that renegotiation may restore efficiency: while some renegotiations result in a net benefit for all stakeholders, many renegotiations do not.

A more recent paper by Herweg and Schwartz (2018) even suggests that the seemingly inefficient large cost overrun often observed for 'megaprojects' may actually be optimal in many cases, i.e., they can be generated by award procedures that minimize the expected final price for the procurer. They show that when the procurer cannot commit not to renegotiate and construction cost differences among bidders are more pronounced for more complex designs, it becomes optimal to fix a simple design ex-ante, allow bidders compete on this simple design, and then renegotiate to a more complex and costlier design ex-post.

In the debates on large infrastructure projects, concessions (contracts between the public sector and a private partner), and PPPs, these potential arguments on the positive effects of renegotiation did not gain much traction however. One main reason, and source of suspicion of the many renegotiations of these projects is that they often occur shortly after contracts are awarded (e.g. Guasch, 2004), when relatively little new information is likely to have emerged relative to what is known by at least some of the parties at the competitive awarding stage.

Transaction costs economics, championed by Williamson (1971, 1976, 1979, 1985), emphasizes the cost of forecasting/agreeing on all possible future contingencies and of writing down such complete contingent contracts, thereby laying a foundation for contract incompleteness and the necessity of ex-post renegotiation. However, it viewed renegotiation as a 'necessary evil', and contrary to property rights theory it also emphasized the large, direct transaction costs of 'haggling' when renegotiating contractual agreements. Bajari et al. (2014) empirically estimate these adaptation costs to amount to 8–14% of contract value in US highway procurement, and 'range from 55 cents to around two dollars for every dollar in change' (Bajari et al., 2014: 1317).

Follow-up theory by Bajari and Tadelis (2001) identifies a clear trade-off between providing the right incentives to contractors and reducing ex-post renegotiation costs. Fixed-price contracting can strongly incentivize contractors to contain

costs, but designing a detailed contract that takes into account contingent circumstances will require more time and added costs. By contrast, under more flexible arrangements, such as cost-plus contracts, ex-post adjustments are less costly, but no incentive exists for cost reduction.

Transaction costs economics also highlights that ex-post renegotiation generates supplier rents for the simple fact that it takes place after Williamson's 'fundamental transformation', i.e. in a situation where the buyer is locked in with the seller in a bilateral monopoly by the signed contract, rather than under the discipline imposed by supplier competition present at the award stage. These ex-post rents from opportunistic 'hold-up' may in turn disrupt the effectiveness of competitive selection procedures by inducing excessively low bids aiming at securing the contract, even at a loss, to then extract rents from ex-post bilateral renegotiation ('lowballing'). The possibility of renegotiating the contract may then lead, in a competitive auction, to the selection of the bidder most confident in their capacity to force renegotiation: the most 'politically connected' rather than the most efficient.

More recently, theoretical contributions by Herweg and Schmidt (2017, 2018) follow up on Williamson (1971, 1976, 1979, 1985) and Bajari and Tadelis (2001) recognizing that with complex projects with high expected cost of renegotiation the early exchange of information on design flaws and improvements is important, arguing that bilateral negotiations or related forms of mechanisms may dominate competitive auctions by inducing contractors to reveal immediately how the design could be improved and possible technical flaws in the project, rather than strategically withholding this information to then use it to hold up the buyer and obtain rents in bilateral post-award renegotiations.

3.2 Cost Overruns in 'Megaprojects' and PPPs

Cost overruns and related forms of price and time renegotiations are ubiquitous in the procurement of complex goods or services. In this section we focus first on studies of cost overruns in 'megaprojects' in general, then in PPPs. Lastly, we consider the causes and determinants of renegotiation.

3.2.1 MEGAPROJECTS

Skamris and Flyvbjerg (1996) focus on very large transportation infrastructure 'megaprojects' and find that cost overruns in the order of 50–100% are very common among these projects in OECD countries. Flyvbjerg et al. (2003) present results from a classic study on cost performance in transportation infrastructure projects. They report substantial and systematic

cost overruns: the cost exceeded the tender price in 90% of the projects, with an average cost overrun of 28%. Cost escalation is a global phenomenon, although it appears to be more pronounced in developing countries than in North America and Europe, and during the 70-year period studied it did not decrease, suggesting that no 'learning' took place. The fact that no learning took place in turn suggests that factors other than mistakes or accidents are at the root of these cost overruns, such as political games or strategic misrepresentation.

Megaprojects are typically defined as complex, large-scale projects that cost $1 billion or more, and that take many years to develop and build. They typically involve multiple public and private stakeholders, are transformational, and impact millions of people (Flyvbjerg, 2014:1). However, there are several alternative definitions, including projects exceeding $250 million, for example (for some definitions, see Adam et al., 2014: 2). There is an association between PPPs and megaprojects because in effect PPPs are only used for very large projects, most of which would qualify as megaprojects.

Megaprojects are significantly growing in frequency, and they are seen by researchers as intrinsically different kinds of projects than normal construction ones in terms of their scope, ambition, stakeholder involvement, and complexity. Flyvberg (2014: 1) identifies 'four sublimes' that drive the development of megaprojects:

Technological: The excitement engineers and technologists get in pushing the envelope for what is possible in 'longest-tallest-fastest' types of projects.

Political: The rapture politicians get from building monuments to themselves and for their causes, and from the visibility this generates with the public and media.

Economic: The delight business people and trade unions get from making lots of money and jobs off megaprojects, including money made for contractors, workers in construction and transportation, consultants, bankers, investors, landowners, lawyers, and developers.

Aesthetic: The pleasure designers and people who love good design get from building and using something very large that is also iconic and beautiful, such as the Golden Gate Bridge. (Flyvberg 2014: 8)

When these four sublimes are at play, important characteristics that make megaprojects problematic are often overlooked. These include the risks intrinsic to long-term planning: the shortage of managers with deep domain experience, who may be replaced throughout the long project cycles; conflicting

interests between public and private stakeholders; unique and non-standard contract designs; over commitment to a certain concept early on, resulting in 'lock-in'; and leaving the analysis of alternatives weak or absent, among others (Flyvberg, 2014: 9).

As for whether cost overruns are more prevalent in megaprojects than in normal projects, the intuitive answer is likely yes, given underlying factors such as long project lifetime and opportunistic or justified firm-initiated renegotiation. Flyvbjerg et al. (2004: 16) study cost escalation in a sample of 258 rail, bridge, tunnel, and road projects worth $90 billion. They focus on the dependence of cost escalation on i) the length of the project implementation phase, ii) the size of the project, iii) the type of project ownership. However, while they find that cost escalation is highly dependent on the length of the implementation phase, and that for bridges and tunnels larger projects have greater percentage cost escalations than smaller projects, their data for all project types do not support the argument that bigger projects have a greater risk of cost escalation than smaller ones: the risk of cost escalation is high for all project sizes and types.

Singh (2011) studies two datasets of large, completed infrastructure projects in India from 17 different infrastructure sectors. He finds that delays and cost overruns have systematically declined since the 1980s, both in absolute terms and as a percentage of project costs. He further finds that absolute as well as percentage cost overruns soar with project size, and that percentage cost overrun escalates with the length of the implementation phase (the longer, the higher the cost overruns in absolute and percentage terms).

Similarly, Shrestha et al. (2013) review 363 Clark County Department of Public Works projects to determine construction cost and schedule overruns in various types and sizes of projects. They find that large and long duration projects had significantly higher cost and schedule overruns than smaller projects with a shorter duration.

Flyvbjerg et al. (2004) also test whether cost development varies with type of ownership of projects: private, state-owned enterprise, or other public ownership. State-owned enterprises are corporations owned by the government, other public ownership is the conventional form of public ownership (typically with a ministry owning the project, which appears in the public budgets). The grouping had to be coarse due to a lack of data. For the 183 projects where ownership type could be established, the authors conclude that state-owned enterprises showed the poorest performance (110% average cost escalation), privately-owned fixed links (like tunnels and bridges) had an average cost escalation of 34%, and other public ownership performed best, with an average cost escalation of 23%.

Finally, a report by the Terrill and Danks (2016) finds that large transport infrastructure projects in Australia valued at $20 million or more and planned or built since 2001 cost a cumulative total of $28 billion more than their promised cost. Their sample includes 836 transport infrastructure projects, and they find that the cost difference between the announced costs and the final costs was 24%.

3.2.2 COST OVERRUNS AND PPPS

As early as 1999, scholars have expressed doubts about the PPP model. For example, Gaffney et al. (1999) consider whether there is an economic case for private finance initiatives (PFIs) in the National Health Service in the UK. They look at a sample of hospitals built with PFIs and found that total costs (construction plus financing) were 18–60% higher than construction costs alone.[20]

In a more PPP-focused study, Raisbeck et al. (2010) compare the performance of PPPs and traditional procurement projects in Australia. They focus on a sample of 21 PPP projects and 33 traditional projects and find that PPPs demonstrated superior cost efficiency over traditional procurement. They further find that 'on a contracted $4.9 billion of PPP projects the net cost overrun was only $58 million – not statistically different from zero. For $4.5 billion of traditional procurement projects, the net cost overrun amounted to $673 million' (Raisbeck et al., 2010: 356). PPPs were found to be completed 3.4% ahead of time on average, whilst 23.5% of traditional projects were late. To make sensible efficiency comparisons between PPPs and normal projects, the authors normalize the project data across both project pools. However, Australia has significant experience with PPP contracts, beginning in the late 1980s with the use of private project financing techniques (Raisbeck et al., 2010: 345).

Similarly, Singh (2018) studies the performance of various types of procurement contracts used for highway projects in India. He finds that construction costs are significantly higher for PPPs than for traditionally procured highways. A leading factor behind these increased costs is the life-cycle approach induced by PPPs. Contractors under a PPP want to maintain the quality of construction during the road building phase to reduce the costs of maintenance (which the contractor is responsible for under a PPP). In projects where the contractor is not responsible for maintenance, the incentive is instead to minimize construction costs at the expense of quality (Singh, 2018: 27).

It is worth noting that in the UK many PPP projects, and hospitals in particular, ended up being anti-economic, to the extent that the recent UK government declared the PFI-PPP experiment closed because of failure. During the budget speech October of 2018, Chancellor Philip Hammond stated:

20. Their conclusions are interesting and worth quoting at length: 'Formal appraisal of the private finance initiative is not an objective process: it systematically reduces the comparative advantage of public sector procurement and disguises the basis of private sector costs. High cost is ascribed to risk transfer but little risk is actually transferred. The discounting method used to compare the present value of different options is politically determined and is set well above the government's interest rates. The government's claim that the private finance initiative represents better value than public procurement is not supported, and clinicians should not allow spurious economic arguments to deflect them from criticising the clinical impact of private finance initiative developments' (Gaffney et al., 1999: 119).

> I remain committed to the use of public-private partnership where it delivers value for the taxpayer, but there is compelling evidence that the private finance initiative does neither … I have never signed off a PFI [Private Finance Initiative] contract as chancellor, and I can confirm today that I never will. I can announce that the government will abolish the use of PFI and PF2. (Benjamin, 2018)

While experts are divided in their evaluation of PPPs (Estache and Saussier, 2014), the UK government's decision appears to be the result of the economic and political costs of a set of failed PPP projects, some of which are listed in Davies (2018). For example, Carillion – a large construction services and facilities management company – collapsed after it took an unexpected £845 million hit in July 2017. A significant fraction of the shortfall related to two PPP projects: the Royal Liverpool University Hospital and the Metropolitan Midland Hospital, which were facing substantial delays. Other well-known failures include unsafe Scottish and British schools. But perhaps the most famous failure is Metronet, which was the biggest contractor in a £30 billion PPP with the task of upgrading the London Underground. In 2009 the firm collapsed, and the National Audit Office found it to have cost taxpayers up to £410 million. Crucial upgrades were delayed as a result.

3.3 Determinants of Cost Overruns

The literature on cost overruns, and specifically their determinants, is vast. Here we only review a part of this literature to highlight some of the main problems, causes, and explanations of cost overruns. A recent summary based on previous studies is offered by Cantarelli et al. (2010: 11), who distinguish four categories of explanations: technical, economical, psychological, and political.

Explanation	Cause
Technical	Forecasting errors including price rises, poor project design, and incompleteness of estimations
	Scope changes
	Uncertainty
	Inappropriate organizational structure
	Inadequate decision-making process
	Inadequate planning process
Economical	Deliberate underestimation due to:
	– lack of incentives

Explanation	Cause
	– lack of resources
	– inefficient use of resources
	– dedicated funding process
	– poor financing / contract management
	– strategic behaviour
Psychological	Optimism bias among officials
	Cognitive bias of people
	Cautious attitudes towards risk
Political	Deliberate cost underestimation
	Manipulation of forecasts
	Private information

These mostly cause 'bad' cost overruns, many of which can be remedied by improving competence and increasing resources in public procurement. However, not all renegotiations, and not all cost overruns, have negative implications. It is important to distinguish between 'bad' cost overruns and contract renegotiations, and 'good' ones. In many cases, renegotiation leading to a cost overrun can benefit taxpayers if the renegotiation is a response to new information or unforeseen circumstances, rather than, say, opportunistic behaviour from the side of the firm or public buyer. If all the relevant stakeholders are involved, then renegotiation could be beneficial and in the public interest if all stakeholders are better off as a result of renegotiation (Huberman and Kahn, 1988).

For example, Beuve et al. (2014) study whether renegotiation is a signal of conflict between contracting parties, or a form of cooperation in order to efficiently adapt to changing environments, by empirically investigating the link between renegotiation and contract renewals when public authorities possess the discretionary power to renew a contract with the same private partner. They use a dataset of 666 PPP contracts in the French car park sector, 252 of which have expired, and codify every renegotiation to investigate their influence on the probability of renewing the contract with the same partner. Their results suggest that there is an optimal frequency of renegotiations, which further suggests that renegotiation should not *per se* be interpreted as a sign of conflict or a failure of the relationship between the parties. They also find that contracts which are not renegotiated are renewed less often and that the scope of renegotiations influences the probability that the contract will be renewed, depending on the number of dimensions renegotiated. Their econometric results show that certain renegotiations clearly increase the probability of

contract renewal, while others do not. In their public procurement subsample (without discretion), they find no evidence that renegotiations are correlated with the probability of contract renewal.

The literature on cost overruns in megaprojects centres primarily on upwards price renegotiation that expropriates the state/taxpayers to the benefit of private contractors. A related but almost 'opposite' issue discussed in the literature on infrastructure projects is government-initiated renegotiations that revise prices downwards, so that it is the contactor's investment – when present – that is expropriated by the state. This often happens when a previous government or administration entered into a long-term contract that goes against the priorities of an incoming government or administration. Some salient cases of government-initiated renegotiation come from Latin America and the Caribbean. Importantly, this form of renegotiation, while not a direct cost overrun for the state, can still be very costly for the state, as it may reduce trust that the state will not unilaterally change contracts and expropriate investments in the future, thereby increasing the cost of future contracts by leading firms to raise the price of their bid due to the risk of being expropriated. For example, Guasch et al. (2014: 19) note some of the internal drivers of renegotiation:

1. elections where the new administration can change the regulation and contract terms and affect the operator rights, etc.
2. new demands of users over the original level of services (in particular in the first generation for roads and airports)
3. bidding errors, aggressive offers, and poorly written contracts and ambiguous risk allocation
4. breach of contractual obligation by government (land expropriations process can take long time and not be available on time), lack of bankability of the project (misperceived risks) and lack of preparation studies (that increase construction risk)
5. opportunistic behavior by operators and governments (governments may decide to modify the contract in benefit of users acting unilaterally to capture electoral votes, or newly elected government changing priorities to modify or expand investments after elections)
6. the opportunity of governments to bypass the fiscal controls to secure additional financing and avoid authorization (by parliament) for additional investments
7. the inability of governments to credibly commit to a policy of no renegotiations leads to the abuse of renegotiation requests
8. the operator's perceived leverage to influence the host government to grant them additional benefits through the renegotiation and weak contract monitoring.

The authors note that when renegotiation is initiated by the government:

> the reason is usually because of a change in priorities, change of government party or that the government cannot fulfill its contractual obligation, although politically opportunistic reasons also exist (in some cases, government wants to anticipate or expand investments, or to delay the increase or decrease tariffs to increase popularity prior to elections, etc.). (Guasch et al., 2014: 10)

When renegotiation is initiated by the private sector, they are instead often instigated for opportunistic reasons, like seeking to maximize the net present value of the PPP contract.

De Silva et al. (2017) show nicely how the expectation of contract modifications by the government increases procurement costs. This study incorporates contract revisions into a standard bidding model in order to estimate the effect of modification on bidder and procurement costs. The authors investigate procurement auctions in Texas between 2004 and 2011, as a change in management procedure sharply reduced the budgeted dollars that supported change orders (contract revisions), which resulted in a large drop in amount and number of change orders issued. This shift allowed the authors to compare bidding in the same environment, but with different contract revision practices. Their data includes information on around 6,300 completed projects, with over 1.8 million bid items let over eight years. They find that contractors bid less aggressively in auctions with a greater likelihood of modifications, with bidder costs increasing in the level of modifications. In the period 2004–2006, before the reduction in change-order budgets, they estimate that bidders' costs were 2.6% to 5.7% higher at the mean level of change orders, compared with projects with no change orders. Further, the cost increase occurred in addition to the direct costs associated with the change order. In the period 2007–2011, when budget restrictions were imposed, they estimate that the impact of modifications on bidder costs in the range of 0.0% to 0.7%. Given that estimated mark-ups held steady over time, the reduction in contractor costs resulted in a decline in project procurement costs of 2.2% to 6.5% (De Silva et al., 2017: 4).

De Silva et al. (2017) also document that the decline in the use of change orders was accompanied by improvements (reductions) in cost and time overruns for the contracts in their data. The state accomplished these gains while maintaining the budgeted resources for pre-engineering and construction management efforts, which suggests that enhancements in managerial efficiency were behind the improvement in project performance. Their results suggest that better oversight of the change order process is a more straightforward way to deal

with incomplete contracts, as opposed to solutions like design build, which fundamentally alters the contracting process.

Another common negative determinant of renegotiation identified in the literature is lowballing during the ex-ante procurement competition. This problem is perhaps less relevant for very large megaprojects, precisely because there is typically a lack of competition at the award stage, but when the lack of competition problem is solved, it becomes highly relevant also for these kinds of projects. The classic study by Guasch (2004) shows how in Latin America and the Caribbean operators have abused the process of renegotiation to the detriment of the overall welfare of the population. Renegotiation affects welfare in that when a firm is aware that the procurer is likely to enter into renegotiations after the contract award, they will change their strategy in the bidding phase to get awarded the contract, to then initiate renegotiations and increase their profit. Such strategic behaviour has an effect on welfare, as the competitive bidding phase that is intended to ensure competitive prices becomes less pronounced as the focus instead turns to winning the contract through strategies such as underbidding (Guasch, 2004: 37). Since renegotiation is a bilateral negotiation, the final outcome need not be guided by efficiency and welfare concerns, and rents could be transferred. Guasch (2004: 142) also shows that governments frequently use renegotiation strategically to secure additional benefits, leading in aggregate to early and frequent renegotiations, which of course is costly per se and discourages future competition, lowering welfare through both these channels. Guasch (2004: 93) also finds that the belief that the government is corrupt, and therefore subject to influence, will enhance the operator's belief that renegotiation is more likely and hence that the capture of additional rents is possible. He finds that the more widespread the corruption, the higher the probability of renegotiation (Guasch, 2004: 89). Contracts involving the use of multiple criteria are also susceptible to manipulation and corruption (Guasch, 2004: 98).[21]

Guasch (2004) acknowledges that renegotiation does not always have a negative effect on welfare: of course; when assumptions that seemed reasonable when planners developed the key economic parameters of a contract have been proven incorrect, renegotiation may increase welfare when renegotiation is a response and an adaption to unforeseen circumstances, new problems, and additional information and experience. What has a negative effect on welfare, and what Guasch takes as a proxy for poor performance, is the prevalence of opportunistic early renegotiations, taking place when little new information has emerged to justify a renegotiation. The study notes that renegotiation may also have a positive impact when it is a remedy for corrupt exploitative contracts entered into by previous governments. Sometimes, as in some power projects

21. Aguirre (2013) studies 26 PPP transport infrastructure concessions in Peru and finds that they were renegotiated more frequently during election years. The results might suggest that renegotiation can be influenced by more electoral votes for a certain candidate or party (or populism) and/or by corruption or capture by interest groups (Aguirre, 2013: 14). More data is needed however to prove such underlying reasons.

in Latin America, new administrations questioned the high cost of contracts signed by outgoing administrations. In one case in 2002, the Dominican Republic refused to honour contracts they thought had excessive terms and demanded renegotiation (Guasch, 2004: 69). In one case of government-initiated renegotiation, the government was required under the inherited contract to pay $3.2 million per month even if the company did not deliver any electricity.

An often cited empirical study by Limi (2013) focuses on the possibility that the expectation of renegotiating the contract may lead, in a competitive auction, to the selection of the bidder most confident in their capacity to force renegotiation, leading the operator to propose a price that is not financially sustainable (so-called aggressive bidding or lowballing). It analyses the endogeneity between bid strategy and ex-post adjustments. Using procurement data on rural road projects in Nepal, it shows that the bid strategy and adjustments are determined endogenously in the system. Anticipating cost and time overruns, firms would likely undercut normal bid prices. Then, ex-post contract adjustments actually happen, because of their overly aggressive bids.

More recently, Ryan (2019) digs deeper into this phenomenon using bid and renegotiation data on large power projects in India. He constructs a rich dataset on investment, bidding, contracting, and contract renegotiation in power procurement auctions for a set of Indian states. The contracts run for 25 years, which means there are severe risks that cost shocks (particularly coal prices) could change the production cost during the life of a contract. Further, bidding firms are allowed to index their bids to the price of coal. The main findings of these reduced-form analyses of the data are the following: i) renegotiation of contracts is widespread, and among auction winners where contract outcomes can be found, half asked for approval by the regulator to change contract terms ex-post. About one-third of those who petitioned the regulator were successful in winning some formal change to the contract; ii) renegotiations respond to cost shocks for firms exposed to the price of coal (the large effect of cost shocks on renegotiation is surprising, however, given that firms could index their bids to the price of coal, and thus insulate themselves from coal cost shocks entirely); iii) most importantly, he finds that politically connected firms[22] index less of the value of their bids to coal prices, thereby exposing themselves to fluctuations in fuel prices. A case study of a power plant is then used to show that not indexing is a strategy employed deliberately to lower their bids by lowering their offered prices late in the life of a contract. The strategy makes bids appear lower up front, while it increases the risk of renegotiations and hence payments to firms ex-post.

22. The measurement of firm connectedness is based on how much free coal was provided by the government to power companies during the 'coalgate' scandal, and he considers firms that received free coal to be politically connected, in the sense of having greater influence over the government.

The bids used for these auctions are rich in detail, allowing Ryan (2019) to estimate a structural model to infer the price renegotiations the firms anticipated at the bidding stage. He therefore constructs and estimates a structural model of bidding in scoring auctions to characterize equilibrium bidding when bidders are heterogeneous both in cost and in the payments they expect after renegotiation. The results show that bidders offer power below cost because of the expected value of later renegotiation. He then uses the model to simulate bidding and efficiency in the absence of post-award renegotiation, finding that strict contract enforcement (banning renegotiation) would lead to more competition and lower prices. With no renegotiation, equilibrium bids would increase to cover the cost of providing electricity, but firms' mark-ups would fall sharply. Production costs would decline, however, because projects would be allocated to lower-cost bidders rather than to those who expect larger payments in renegotiation.

Numerous other studies have investigated the determinants of renegotiations in different contexts. For example, Guasch et al. (2008) examine a dataset of 307 concessions awarded in Latin American countries between 1989 and 2000 in the sectors of transport and water, analysing the causes behind the high frequency of renegotiation of these contracts. Their study highlights the importance of having a regulator in place when awarding the contract, the relevance of economic shocks (more renegotiations during downturns), the relevance of political cycles (more renegotiations after elections), and the importance of good institutions such as bureaucracy, rule of law, and control of corruption, to reduce the incidence of renegotiations (Guasch et al., 2008).

Athias and Nuñez (2008) empirically assess the effect of the 'winner's curse' in auctions for toll road concessions using a dataset of 49 worldwide road concessions. They show how the winner's curse effect is particularly strong in toll road concession contract auctions. More precisely, the winner's curse effect prevails on the competitive effect so that bidders bid less aggressively when they experience more competition. They also observe that the effect of the winner's curse is weaker when the likelihood of renegotiation is higher, so that bidders will bid more strategically in weaker institutional frameworks.

Guasch and Straub (2009) examine infrastructure concessions in Latin American and the Caribbean between 1985 and 2000 and finds that more than 41% of concessions were renegotiated and the government was the main initiator of the process. They show that corruption is an important factor in explaining the occurrence of renegotiation. Specifically, corruption increases the likelihood of those happening at the initiative of firms, while limiting those at the initiative of governments.

Baeza and Vassalo (2010) studies private concession contracts for toll roads in Spain. They find that these contracts are characterized by two features: significant traffic overestimations and frequent renegotiations. While a considerable percentage of the renegotiations cannot be attributed to any cause, most resulted in higher tolls or longer contracts. The authors attribute this to two causes, one of which is the winner's curse, which can be further extenuated when bidders know that a government is willing to renegotiate (Baeza and Vassallo, 2010: 5).

Guccio et al. (2012) empirically test the determinants of adaptation costs in public works procurement using a dataset on Italian public works contracts. They find that complexity, uncertainty, and the connected need for adaptation, optimism bias, and political incentives to underestimate costs, opportunistic behaviour, and corruption are all significant causes of cost overruns. The opportunistic behaviour of the firm is confirmed as a very relevant determinant of adaption costs. They end by offering some tentative policy recommendations:

> The fact that the opportunistic behaviour of the firm turns out as a very relevant driver would suggest to enhance the role of reputation in the awarding of the contract. This may counterbalance the 'compensation' role that renegotiation can assume, as a way to recover the 'losses' from underbidding in competitive procedures. In this case, however, great attention should be paid to the design of proper incentive schemes for the contracting authority. (Guccio et al., 2012: 1904).

Cruz and Marques (2013) studies data for 87 projects in transportation, health, water supply, and energy. The sample includes all concessions granted by the Portuguese government between 1984 and 2008, and many of those granted by municipalities. Their results provide evidence that concessions with higher investments and longer durations are more likely to be renegotiated, that a higher regulatory agency age correlates with a lower probability of renegotiation, and the existence of a regulatory agency when the contract is signed decreases the probability of renegotiation. They further find that the supervision of the contract design by an independent third party can help concession grantors to avoid contractual gaps that lead to ex-post opportunism by concessionaires and that public tenders increase the probability of renegotiation, unlike direct awards (Cruz and Marques, 2013: 1086). The fact that concessions awarded through public tenders are more likely to be renegotiated than those awarded directly can be interpreted as a form of 'winner's curse' or aggressive bidding.[23] The authors find that the main reasons for renegotiation are consistent with:

23. The 'winner's curse' is a phenomenon when the value of a contract is the same ex-post for all bidders, but where ex-ante information on the value of the contract differs between bidders. This can result in the most optimistic firm winning the contract, then discovering that the value of the contract is less than anticipated.

> (1) the government did not enforce contractual agreements, whether by delays in expropriations (several road concessions), changing the project physical design or the concessions scope (road and water projects) or by not being able to increase prices (Lusoponte concession); and (2) forecasts included an optimism bias. (Cruz and Marques, 2013: 1088)

Bitran et al. (2013) analyse renegotiations of road concessions in Chile, Columbia, and Peru for the period 1993–2010. The initial value of the 61 contracts signed between this time was nearly $14 billion. They found that 50 out of the 61 concession contracts had been modified, resulting in more than 540 renegotiations, and that:

> renegotiations of contracts have implied high fiscal costs and an increase in the terms of the contracts. Among contracts renegotiated, on average, the fiscal cost exceeded 25 million, 45 million and 265 million in Peru, Chile and Colombia, respectively (USD constant prices of 2009). (Bitran et al., 2013: 40)

Lastly, they find that state-led renegotiations were more common than firm-led renegotiations and often motivated by opportunistic government behaviour.

Decarolis and Palumbo (2015) empirically analyse a sample period of medium-sized public works contracts in Italy between 2000–2007 with a value of €150,000 or more. The contracts are operationalized as the percentage change of the final price paid to the contractor relative to awarding price (cost renegotiation), and the percentage change of the number of days to complete the work, relative to the original contractual length (time renegotiation). They find that both time and price renegotiations are systematic, but also nearly uncorrelated: their linear correlation is only 4.5% and no evidence of a non-linear relationship is present (Decarolis and Palumbo, 2015: 78). The study also provides suggestive evidence that the involvement of additional parties in the project design increases delays, although cost overruns decline (primarily when there is a competitive selection of third-party designer).

Engel et al. (2019) construct a model for renegotiations and test its predictions on data from Chilean renegotiations of concessions. They show that PPPs have advantages from the point of view of incumbent governments, because they allow them to exceed spending limits. This is linked to poor accounting standards that allow governments to use renegotiations to increase spending without oversight (Engel et al., 2019: 21). The authors predict that i) in a competitive market, firms lowball their offers, expecting to break even through renegotiation; ii) renegotiation compensates lowballing and

adds additional expenditures; iii) the government uses renegotiation to increase spending and shift the burden of payments to future administrations; and (iv) there are significant renegotiations during the construction phase. The Chilean data on renegotiations of concessions are consistent with the results of their model.

4. Quality and Past Performance

IN SECTION 2, we mentioned some recent and highly debated procurement cases in Sweden that seem to have resulted in poor quality: the statistics for the annual national unemployment numbers, the poor working conditions at the sites of one contractor at Förbifart Stockholm, and the failure of another contractor to deliver simple goods to hospitals on time – causing hundreds of surgeries to be cancelled. These cases often occur when price is the main aspect of a bid focused on by procurers, which can incentive firms to bid low and provide inferior quality. Cost overruns may therefore not be the only or main source of inefficiency linked to a lack of competent procurement design and management.

Instead, 'quality underrun' may be even more problematic, as it is harder to observe and measure. Quality of procured goods or services is typically underprovided by private contractors if effective monitoring and incentive mechanisms are not in place (Hart et al., 1997). In order to monitor and incentivize quality provision, data must be gathered on the quality of the good or service provided by each contractor. Data gathering on the performance of contractors and public procurers is essential to i) enforce quality standards promised by contractors and possibly use data on the quality of their previous projects as a weight in the bidding stage, ii) determine the success of public procurers in order to reward good procurement and to not reward poor procurement, and iii) determine the effects of policy initiatives on quality.

In this section we examine the effects the introduction of a reputational mechanism linking future contract awards to suppliers' track record produces on suppliers' performance in public procurement by summarizing and discussing the findings from a firm experiment by Decarolis et al. (2016). In the final part of this section we focus on the problem of market entry for suppliers when a reputational mechanism is

introduced in the awarding procedure, confirming the results of Decarolis et al. (2016) with those of an experimental study by Butler et al. (forthcoming).

Public procurement policy is generally recognized as being characterized by an unstable tension between the public expectations of transparency and accountability, and of efficiency and effectiveness pursued by public management. Despite this tension, one of the practices that governments can emulate from the private sector to improve performance in the public procurement process is the buyers' reliance upon preferred suppliers with the best past performance as a way to reduce procurement risk (Kelman, 1990). This section briefly reviews the literature on reputational mechanisms in public procurement and ends with some policy recommendations.

4.1 Research on Reputational Mechanisms

Studies on the private sector have shown important effects of reputational mechanisms. For example, Banerjee and Duflo (2000) shows that firms with a better reputation are more likely to be involved in more flexible cost-plus contracts, and are associated with lower cost and time overrun. The large amount of available evidence on the design and effects of reputational mechanisms on electronic platforms (like eBay), where formal contracting is rarely used and reputational mechanisms are the main tools for quality assurance, has been recently surveyed in Tadelis (2016). A frequent finding in this literature is that reputation strongly affects the probability of selling, but the effect on price is typically small. A recent study on the private sector shows how certification and reputation can affect entry decision and increase the quality of entrants (Hui et al., 2018). The results of this study indicate that the availability and precision of past performance information is important not only for the rate of entry in a market, but also for the quality of who is actually entering and hence how markets evolve in the long run.

These findings have direct implications for the design of reputation and certification mechanisms in markets plagued by information asymmetries like public procurement. Dellarocas et al. (2006) discuss some important dimensions in which Internet-based reputation mechanisms differ from traditional word-of-mouth networks, surveying the most important issues related to their design, evaluation, and use in the context of public procurement. However, empirical evidence on reputation mechanisms in public procurement markets is still absent, although the theoretical debate on the issue has been rather lively (Kim, 1998; Doni, 2006; Calzolari and Spagnolo, 2009).

4.2 Public Policy in the US and EU

As is standard in private procurement, public procurement officials can reduce procurement risk by gauging information regarding a supplier's past performance and using it for future supplier source selection. This method is now largely applied in the US federal procurement system. With the Federal Acquisition Streamlining Act of 1994 and the Federal Acquisition Reform Act of 1995, the US undertook a major policy change that saw the use of contractors' past performance as one of the pillars of an overall attempt to reduce the rigidity of the procedures in the Federal Acquisition Regulations (FAR) and to allow public buyers to use more flexible purchasing methods similar to private sector management practices. In the policy implementation phase some obstacles emerged, for example, in inducing contracting officers to collect and share past performance information, but the implementation of the policy went on.

Additional legislation expanded the role of reputational systems for federal procurement, and there were several policy initiatives on past performance over the years. For example, in 2009 the Government Accountability Office (GAO) recommended a transition to a single set of evaluation factors for use in contractor performance evaluations.[24] In the 2011 Office of Federal Procurement Policy's memorandum, the administrator confirmed the requirement to use the Contractor Performance Reporting System (CPARS) and also offered additional steps and strategies for improving the collection and reporting of quality past performance data into CPARS.[25] In 2013 the Obama administration updated the Federal Acquisition Regulation to standardize the factors used in evaluating contractors' performance,[26] and require that all past performance information be entered into CPARS.[27]

However, there is still a lack of consensus among policy makers around the world on the improvements that well-designed and managed past performance-based vendor rating systems can produce in public procurement. This becomes readily apparent when comparing procurement policy in the US to procurement policy in the EU. Until 2014 the European Union's EU Procurement Directives explicitly *prohibited* taking past performance into account when comparing bids among potential suppliers. European regulators driven by the main goal of fostering market integration across EU member states believed that the use of reputational indicators would have hindered entry of foreign suppliers in national procurement markets by e.g. allowing manipulations in favour of local incumbents or introducing undue subjectivity into the procurement process (Gordon and Racca, 2014). Many public procurers continued to request permission to take suppliers' past performance into account – requests EU regulators de-

24. GAO-09-374, *Federal Contractors: Better Performance Information Needed to Support Agency Contract Award Decisions*, April 23, 2009.

25. Office of Federal Procurement Policy (OFPP), *Improving Contractor Past Performance Assessments: Summary of the Office of Federal Procurement Policy's Review*, and Strategies for Improvement, 21 January 2011.

26. Office of Management and Budget (OMB)-released memorandum, *Improving the Collection and Use of Information about Contractor Performance and Integrity*, dated 6 March 2013. The purpose of this memorandum was to establish a baseline for reporting compliance, set aggressive performance targets that can be used to monitor and measure reporting compliance, and ensure the workforce is trained to properly report and use this information. This memorandum establishes a 100% Annual Reporting Performance Target for Fiscal Year (FY) 2015 for past performance reporting compliance on contracts over the Simplified Acquisition Threshold (SAT). OFPP's strategy to improve past performance information and respond to Section 853 of the NDAA for Fiscal Year 2013 is to increase oversight of contractor performance evaluations, develop government-wide past performance guidance, and revise the FAR. OFPP worked with the FAR Council to revise the FAR to implement provisions of the NDAAs for Fiscal Years 2012 and 2013 related to assigning responsibility and accountability; implementing standards for complete evaluations; and ensuring submissions are consistent with award fee evaluations. Revisions by OFPP and the FAR Council to the timing of the contractor comment process in accordance with the acts became effective in July 2014.

nied until the most recent directive on public procurement.

It is only with the Directive 2014/24 on Public Procurement that the EU regulators, pushed by procurement agencies and research results (see e.g. Spagnolo, 2012), finally opened up to the use of suppliers' track records. They created yet another ground for exclusion based on poor past performance by the economic operator. Under these new rules, contracting authorities can exclude economic operators that have:

> shown significant or persistent deficiencies in the performance of a substantive requirement under a prior public contract, a prior contract with a contracting entity or a prior concession contract which led to early termination of that prior contract, damages or other comparable sanctions. (EU Directive 2014/24, art 57(4)(g))

To conclude, whether there is a trade-off between reputation and entry and, if so, whether there are ways to improve reputation's effect on entry, are issues every procurement manager in the private or public sector should be able to assess independent of existing regulations. At the same time, policy makers should discuss whether the use of past performance in the public procurement process is a valuable policy for improving suppliers' performance or not and how the reputational mechanism should be designed to achieve optimal results.

Unfortunately, the leading management, operations research, and even public procurement textbooks offer little guidance on these issues, as research on the design of reputational mechanisms in industrial procurement, and more specifically in public procurement contexts has been lacking for a long time. However, some recent academic works, mentioned above, investigate the benefits of past performance in public procurement and show how an effective reputational mechanism can be designed.

4.3 Past Performance and Procurement Outcomes

Quantifying the costs and benefits of running a reputational mechanism in public procurement is essential, especially given the sheer economic size of this market, but little reliable evidence is available at present. The aim of the study by Decarolis et al. (2016) is to analyse and quantify the costs and benefits of using an appropriately designed reputational/vendor rating system as a supplier selection tool in public procurement.

This study tries to overcome this problem by exploiting a rich set of data related to the experimental introduction of a past performance monitoring system in the procurement practices of a large Italian multi-utility company, ACEA S.r.l.,

27. A new version of CPARS was released in July of 2014 which merged three separate modules (ACASS, CCASS, CPARS) into one module to standardize the past performance evaluation process.

involved in the production and distribution of water and electricity in central Italy and subject to public procurement law. This company is very similar to some of the large US operators in the same field in terms of several observables such as the number of employees, the customer base, the power grid size, the total turnover, and the expenditures for maintaining and upgrading the power grid. For these firms, the quality and safety standards followed in the execution of the construction works performed to maintain and update the power grid are essential not only for an elective functioning of the grid, but also to limit both the number and the severity of the workplace accidents which characterize this industry.

Decarolis et al. (2016) follow the experimental introduction of a reputational mechanism in procurement made by this company in 2007 with the technical support of two of the authors. To build the reputational mechanism, the company created a list of 136 observable parameters measuring both the quality and safety features of the job executed. Three months after the new audits had begun, the company communicated through a public statement the introduction in the new audit system of a numerical 'reputation index' and that, after a few more months of data collection, this index would be used to award new contracts. The aim of the company was to set out an experiment introducing a new audit system only for a subset of contracts, all of those involving public illumination and electrical-substation works, and its stated goal was to learn whether the new audit system could be beneficial for its overall procurement.

The study investigates the evolution of both price and performance around the time when the new audit system was publicly announced, but before the initial use of the scoring auctions incorporating reputation. The audit system changed in late 2007, while the award system changed in mid-2010. For two and half years after the new audits were introduced, the company continued awarding contracts through lowest price auctions.

During this period, the company recorded the performance of its contractors. It established that the new audits would be used in the future to switch from price-only to price-and-rating auctions, with a linear scoring rule auction assigning 75% of the weight to the price offered and 25% to the reputation index. In the four meetings to follow, they informed contractors about the forthcoming award rule change and disclosed how compliance with the 136 parameters was evolving across all the audited contractors. Furthermore, the company planned that the Reputation Index (RI) would apply exclusively to those bidders audited at least seven times in the relevant time window. Otherwise, a bidder would be assigned a RI equal to the *average* RI of the bidders in the auction. The same averaging rule was going to be used for new entrants in order

to not compromise the entry of new bidders (i.e. firms never audited).

The study analyses how compliance with the parameters evolved in response to the announcements of the introduction of a past performance mechanism. The research shows that essentially all awarded suppliers improved their compliance in similar ways, following the same strategy, with compliance increasing relatively more for those parameters with higher weights in the computation of the reputation index. Moreover, costs and delays – two proxies that are generally used for performance measurement, but that the Italian company decided not to include in the index – did not worsen.

The second part of the research investigates whether and to what extent the improvement in performance caused a change in procurement costs. This is key to evaluating the desirability of the policy change and is made feasible by the nearly ideal timing of the experiment. While the continued use of price-only auctions for more than two years after the announced switch to scoring auctions was due to legal constraints, this feature is what allows the authors to study the price effects linked to performance without confounding effects driven by changes in the market structure. Specifically, for the price-only auctions, all suppliers are treated symmetrically regardless of their rating and this reduces the chances that estimated price effects are driven by the barriers to entry that an immediate switch to price-and-rating auctions would have set up.

The empirical strategy used in this part of the analysis exploits a second dataset containing information on all the contracts awarded not only by the company, but also by all other Italian public contracting authorities (CAs) during the period 2005–2010. It used the variation across procurers and over time to develop a difference-in-differences estimation strategy.

The first set of findings shows that suppliers' quality and work safety increased from the date of the first announcement of the policy change. Compliance with the monitored parameters evolved in response to the timing of the five public announcements. Using audit data for the years 2007–2009, the authors show the clear evidence of a substantial change in contractors' behaviour: compliance in the 136 parameters increased from 25% before the first announcement (t1) to more than 80% after the fifth announcement (t5). The authors find that essentially all active suppliers improved their compliance in similar ways, and did so strategically, with compliance increasing relatively more for those parameters with higher weights in the computation of the reputation index. While this is compatible with a strategic allocation of effort, multi-tasking likely occurred mostly within the set of parameters scored and did not cause a reduction in the effort expended on

unmonitored tasks. According to the company's engineers, the broad set of parameters chosen was exhaustive in terms of determining safety and quality for the selected contract types. Indeed, the company's own evaluation of the policy change also found the increase in performance to be fully satisfactory.

Furthermore, considering the date of the first announcement to be the one characterizing the occurrence of the policy change, then there is no significant effect on the price paid by the company. More specifically, by looking at any symmetric window of time around the first announcement, prices remain stable on average. Indeed, we used a statistical technique called a 'difference-in-difference' analysis which showed no sign of an increase in prices linked to the introduction of the reputational mechanism and the consequent sharp increase in internal and external quality and in work safety standards when compared with comparable firms across the country.

Moreover, the authors went on and looked at external quality measures, and also find a significant improvement in these measures caused by the experiment, i.e. a fall in both the number and length of blackouts compared to other comparable firms in the industry. These results are summarized in Figure 2 below.

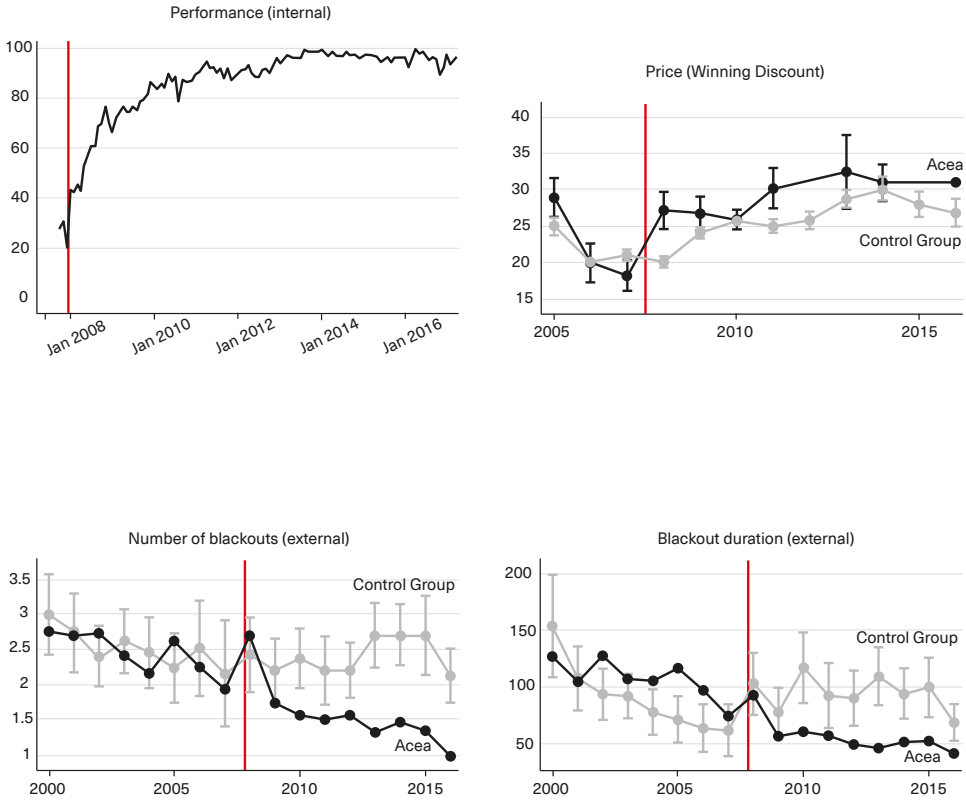
The first panel (top left) shows the increase in the internal work quality and safety indicator induced by the experiment, an increase that persisted even after the experiment was interrupted (for politically-induced change of management). The second panel (top right) depicts that prices (or discounts) did not change significantly as a result of the experiment. The third and fourth panels (below) illustrate that a significant increase in external quality measures corresponded to the increase in internal quality and safety measures.

Figure 3 shows that – instead – in the same period, quality provision in the water sector, which was not involved in the experiment, actually worsened in comparison with the control group of providers.

The first panel (top left) shows that unexpected blackouts also decreased after the experiment, while the second panel (top right) reveals that programmed power cuts linked to maintenance operations did not change. The third and fourth panel (below) indicate that analogous improvements did not occur in the water sector of the same firm, which was not involved in the experiment. These final results demonstrate that the large improvement in internal quality and safety measures caused by the introduction of the reputational mechanism corresponded to a significant increase in effective quality for the firm's customers.

The study concludes with a back-of-the-envelope cost-benefit calculation focusing only on gains from work safety improvements (that is, completely ignoring the huge quality gains). Under the worst-case estimate of the price increase

Figure 2. Performance, price, number of blackouts, and blackout duration.
Source: Decarolis et al. (2016).



observed in the final part of the sample, the increase in procurement cost amounts to €2.4 million per year. By using the OECD figures for the value of a statistical life together with the same statistical model employed by the company's engineers to map the relationship between changes in parameter compliance and the occurrence of fatal accidents, the authors estimate that the benefit from increased compliance on the safety parameters ranges between €3.5 and €5.3 million per year. This is a lower bound for the benefits that does not account for both quality improvements and safety improvements associated with non-fatal injuries. Hence, the fact that it exceeds the upper bound of the cost leads the study to conclude that the policy change was beneficial.

4.4 Entry and Reputational Mechanisms

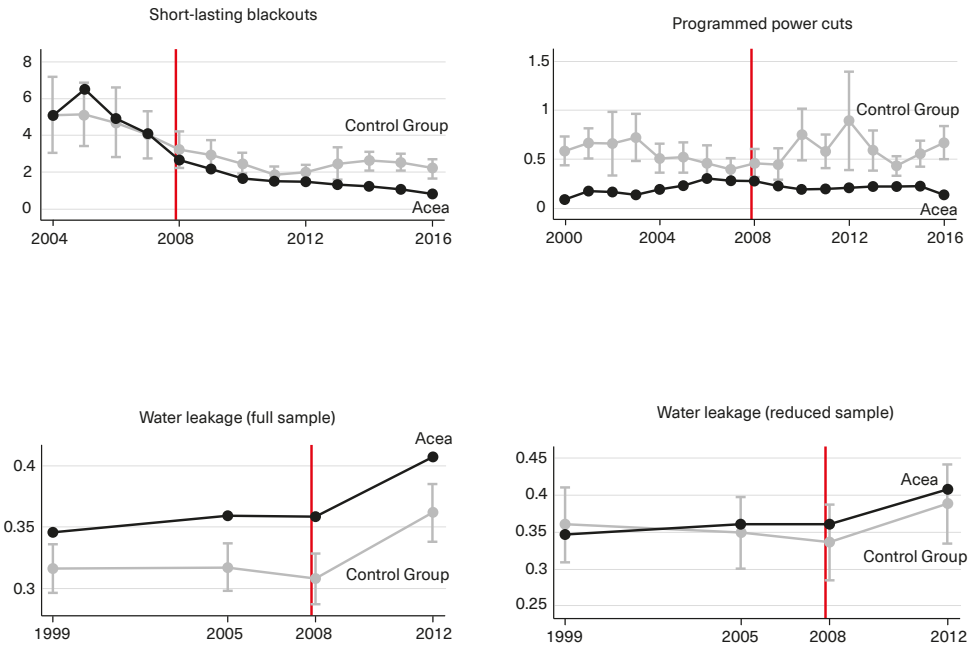
The final section of Decarolis et al. (2016) studies whether the observed effects are the result of changes in the selection of contractors bidding or in their behaviour. The evidence revealed by this study is compatible with the presence of moral hazard: the authors find that suppliers observed bidding both before and after the new rating system is announced stop offering suspiciously low prices. These are precisely the anomalous, too low bids often associated with poor contractual performance. On the other hand, the study finds only limited effects of selection and entry based on three features in the data. First, while several suppliers leave the market, the timing of their exit is not associated with the announcements. Second, both the firms that leave the market and those that remain have similar bidding patterns. Third, considering many observable characteristics, the firms leaving the company's auctions are no different from the suppliers that leave the auctions of another large multi-utility company that did not participate in the experiment and that are used as a benchmark.

Another recent study by Butler et al. (forthcoming) tries to fill part of the knowledge gap on the effects of past performance-based selection on entry in procurement markets, and it offers clear evidence-based results for future policy. Butler et al. (forthcoming) build a simple model of repeated procurement with limited application and potential entry and implementing it in the laboratory. The authors consider reputation as an incentive system to limit moral hazard in the quality dimension as well as on the effect of reputation on selection through entry. The study assumes that some important costly-to-produce quality dimensions of supply, although observable for the parties, are too expensive to verify for a court to be governed through an explicit contract and are therefore left to reputational governance.

An additional assumption is made, considering a potential entrant that is more efficient than all incumbents. In this context, the study investigates how quality, price, entry, and welfare change when an ordinary and transparent reputational mechanism is introduced that rewards an incumbent firm providing costly high quality with a bid subsidy in the subsequent procurement auction, but that may also award a bid subsidy, of varying size, to an entrant with no record of production, as often takes place for example in private construction procurement where all qualified suppliers start with the same number of 'points'. These points are useful for selection, and companies can lose points by providing poor performance and regain them by improving it, but up to the maximum initial number.

The first set of results of the study by Butler et al. (forthcoming) demonstrate that concerns about reputation-based

Figure 3. Short-lasting blackouts, programmed power cuts, water leakage for both full and reduced sample.
Source: Decarolis et al. (2016).



selection hindering entry are indeed justified: naively introducing a 'standard' reputational mechanism in which only positive past performance is awarded with a bid subsidy in the following procurement auction enhances quality provision, but it also significantly decreases entry. However, in contrast to this first result and the convictions of policy makers, the study shows that *properly designed* reputational mechanisms in which new entrants, with no track record, are entitled to an averaged or high reputation score – as in the case of the company studied by Decarolis et al. (2016) and as is often done in the private sector, or with point systems for driving licenses – actually *promote rather than hinder entry* while, at the same time, delivering a substantial increase in high quality provision. The third important result of this study is that, again consistently with the findings in Decarolis et al. (2016), the total cost to buyers does not increase significantly when

a reputational mechanism is established, even though costly quality provision grows. The introduction of bid subsidies for good past performance seems to benefit the buyer/taxpayer by expanding competition for incumbency, reducing winning bids sufficiently to compensate the potential increase in procurement costs produced by bid subsidies.

4.5 Conclusions on Past Performance and Quality

The interaction between the shape of explicit procurement contracts and the design and functioning of reputational mechanisms remains an important topic for future research. In the study by Decarolis et al. (2016), the merits of using past performance are to stimulate greater efforts from contractors when executing public works. The evaluation of the evidence from an experiment undertaken by a large multi-utility company in Italy subject to public procurement regulation has highlighted strong improvements in performance – quality and safety at work – after the firm announced its intention to use past performance scores to award future contracts.

Once the merits of this kind of reputation mechanism are demonstrated to improve contractor performance, several aspects remain unknown and leave room for further research. In their work, the authors suggest a focus on optimizing the parameters' weight, how to select the rating for new entrants, how to structure the weights in the awarding criteria, and how to choose the optimal 'length' of the indicator and how heavily older information should be discounted. Even the optimal timeline at which the switch to a reputation system should occur seems an interesting problem to assess in the future. As for the issue of market entry when a reputational mechanism is adopted by buyers, Butler et al. (forthcoming) demonstrate that a trade-off is not necessary between appropriately designed reputational mechanisms and entry by new firms into a procurement market, as a well calibrated reputational mechanism may increase entry and quality provision simultaneously, without increasing the cost for the buyer. If these results can be confirmed, the findings suggest that the Federal Acquisition Regulation (FAR) in the United States – which allows past performance as a criterion for selecting bids – has introduced room for an effective policy which (if appropriately designed and implemented) creates incentives to improve quality and efficiency in public procurement without undermining entry of new or foreign firms, possibly even facilitating entry, a policy that EU regulators have been forbidding for a long time.[28]

The results in Butler et al. (forthcoming) and Decarolis et al. (2016) show however that a past performance-based vendor rating policy, which aims to improve suppliers' quality

28. Also thanks to these studies, with the 2014/24 EU Directives on procurement, European public procurement policy has shifted towards a framework open to the use of past performance, even if only as an exclusion criteria.

but not undermine the facilitation of market entry, can obtain a positive outcome only when the reputational mechanism is appropriately designed and implemented. To design and appropriately implement these mechanisms, public buyers need the necessary competences, as well as incentives coming from measurement and rewards for better procurement outcomes, and the legal and regulatory space to do it. The large improvements in quality obtained in these studies is an indication of the potentially massive quality-related waste that any country may incur if it does not provide its public buyers with the competence and data necessary to design and implement effective past performance based mechanisms.

More generally, a lack of ex-post reviews, and the data collection necessary for them, is a broader issue in Sweden identified several years ago (see e.g. Molander et al., 2002). Nilsson et al. (2012), for example, conclude that it is not possible to conduct follow-ups on the contracts procured by Trafikverket for the ten years prior to their study. That is, it is not possible to compare actual final costs with the contracted cost, nor is it possible to compare it with the investment plan initially decided upon by the government: 'systemic knowledge of costs for construction, management, and maintenance of the country's roads is in practice non-existent at the contractual level' (Nilsson et al., 2012: 20). Other recent reports commissioned by Konkurrensverket also conclude in the recommendation to collect much better data (Bobilev, Guglielmo, Paltseva, and Spagnolo, 2015; Tukiainen and Halonen, 2020: 61).

Consistent and competent public procurement data collection is not only the norm in countries like the US, UK, and Italy, but it is common in transitional and developing countries like Brazil, Hungary, Czech Republic, or Latvia, and is essential to evaluate the performance of contractors, as such evaluations can feed into both past performance ratings, and also to assess the performance of public procurers in charge of the project and reward them if they perform well. Such data collection should be inexpensive when considering the many benefits of its use. Nilsson et al. (2012) conclude that the argument that it would be too costly to conduct project follow-ups is unsustainable, and that the data needed for follow-ups is already being collected for other reasons.

There are signs that Sweden is starting to move in the right direction on the issue of procurement data: Riksdagen recently accepted a legislative proposal (Prop. 2018/19:142) on improving statistics on public procurement, which could be a first step to improving the situation and serve as a basis for evaluations of suppliers and hopefully public procurers.

Trafikverket is currently engaging in a past performance initiative called 'UppLev'. The idea is to give contractors a rating between 0 and 4 for nine different categories of performance including time, quality, economy, documentation, safety,

etc. How many or what categories are evaluated depends on the type of work the contract involves, and evaluations occur throughout the contract period, with an intensity determined by type of contract. This is a move in the right direction, and we hope it is supervised and designed by high-level expertise to increase the probability of success. If there is a lack of high-level expertise in design and implementation, these tools can be used to do more damage than good.

5. Evidence on Public Buyers' Competence

UTILIZING TOOLS like a past performance mechanism requires thoughtful design and effective implementation, which in turn requires competent public procurers. The recent academic literature on competence in public procurement highlights its importance for obtaining good value for money. This section reviews available evidence on the importance of public procurement competence from the economic literature (Section 5.1) and the management literature (Section 5.2).

5.1 Economic Literature

5.1.1 STUDIES ON STANDARDIZED GOODS AND SERVICES

A crucial starting point for the assessment of the importance of public procurement competence is the study by Bandiera et al. (2009) mentioned in the introduction. These authors analyse procurement purchases by a sample of public bodies in Italy over the period 2000–2005. They distinguish between 'active' and 'passive' government waste. Active waste entails utility for a public decision maker (such as receiving a bribe); passive waste does not entail any utility for a public decision maker (inefficiency due to bureaucratic incompetence, lack of incentives to perform, etc.). They quantify the amount of passive and active waste by exploiting a policy experiment that affects the procurement behaviour of public bodies differently depending on whether most of their waste is passive or active.

Consip is an Italian agency that establishes agreements with suppliers of generic goods that commit to selling a specified product at a given price to any Italian public body. Consip led the centralization of the Italian public procurement stated at the beginning of the time period analysed by the authors. While Consip existed throughout the sample period, only a

subset of their sample goods were available from the Consip catalogue because the centralized framework contracts for different goods and services have different start and end dates and durations. This allowed the authors to observe the same public body and the same good over periods in which the public body purchased the good on its own, and periods when it bought it from Consip.

They then develop a theoretical framework to analyse public procurement outcomes. When a Consip agreement is not active, the price that a public body pays for a certain good is an increasing function of (1) the propensity of that specific public body to engage in active waste and (2) the ability of that public body to avoid passive waste. Since price information is insufficient to identify passive and active waste, they utilize Consip agreements to determine active and passive waste. When a Consip agreement is active, the public body chooses between buying from Consip or elsewhere. Given that Consip offers no opportunity for active waste, the probability that a public body buys from Consip is a decreasing function of (1) but an increasing function of (2). Putting together information about prices paid when a Consip agreement is not active with decisions to buy from Consip when a Consip is active is then sufficient to establish whether price differences among public bodies are due to differences in active or passive waste (Bandiera et al., 2009: 4).

Focusing on a set of relatively standardized goods and services and controlling for a large number of quality characteristics and other determinants of prices, the authors find that, on average, at least 82% of estimated procurement waste is passive, i.e. linked to public buyers' incompetence and lack of incentives rather than to corruption, and that passive waste accounts for the majority of waste in at least 83% of the sample of public bodies (Bandiera et al., 2009: 5). They also find that the average price paid by different Italian public bodies varies substantially. If all public bodies were to pay the price paid by the most competent ones in the 10th percentile, sample expenditure would fall by 21%; if we do not include public bodies below the 10th percentile for which savings are negative, sample expenditures would fall by 27%. If sample purchases were representative of all public purchases of goods and services, savings would then be between 1.6% and 2.1% of GDP.

Bandiera et al. (2009) further find that semi-autonomous bodies (universities and health authorities) that are subject to less stringent bureaucratic rules tend to pay the lowest prices. Compared to these, the average town government pays 13% more. The difference increases further for regional governments (21%), social security institutions (22%), and the average ministry tops the list with 40% higher prices (Bandiera et al., 2009: 5).

Their findings are consistent with the hypothesis that, in

aggregate, most waste in the procurement of generic goods by the Italian public sector is not due to corruption, but to a much more basic lack of competence and incentives to perform. While the results do not in any way imply that corruption is not an important issue in public procurement in Italy, the study indicates that even in a country where corruption is considered a serious problem, the often disregarded passive waste from lack of competence and incentives seems to have a much larger effect.

A more recent paper by Best et al. (2019) tries to quantify how the quality of individual procurers and of the purchasing authorities for whom they work separately affects procurement performance in terms of prices paid for identical goods. The authors study data on 16 million purchases in Russia between 2011 and 2016. As in Bandiera et al. (2009), they exclude works and services to focus on purchases of items that are precisely defined ('off-the-shelf' goods), for which the procurers' mandate is simply to pay the lowest possible price while following the government's policy rules, making performance measurable and comparable across procurements provided the exact good purchased can be identified.[29]

The authors estimate that 40% of the variation in quality-adjusted prices is attributable to the procurers managing the processes like individual procurement officers and the public organizations using and paying for the goods, and that individuals and organizations each contribute roughly half to this. Their findings suggest that there are huge returns to be gained if the state were to employ more competent bureaucrats such as those at the high end of the observed performance range, or if bureaucrats were better trained, and organization-wide characteristics such as management quality improve. For Russia, the authors estimate that if the least effective quartile of individual bureaucrats and organizations had 75th percentile effectiveness in buying standardized goods, this would reduce total procurement expenditures by around 11%, or $13 billion each year, which is roughly 0.9% of Russian non-resource GDP. This estimate again ignores the possibly greater gains from improved procurement competence linked to complex works and services.

The authors then go on to analyse the effectiveness of a specific policy, bid subsidies for local producers, and demonstrate that this changes substantially with the competence level of the procuring officer and organization, suggesting that it is important to tailor the design of a policy to the effectiveness of the bureaucracy that is in charge of implementing it. Policies that are suboptimal when state effectiveness is high may become second-best optimal when state effectiveness is low. In their case, it turns out that the Russian bid preference policy saved the government 17.5% of annual procurement expenses when it was implemented by the least effective quartile of

29. They first develop a simple conceptual framework of procurement with endogenous supplier entry to guide their analysis. In their stylized model, bureaucratic effectiveness – or procurement competence – affects procurement outcomes in two ways: i) imposing costs that raise the cost to suppliers to fulfil the contract; ii) imposing higher participation costs on sellers wishing to bid on government contracts. As a result, less effective bureaucracies attract fewer and less diverse participants, and pay higher quality-adjusted prices. Turning to data, to be able to use prices as a measure of procurement performance they use machine learning tools on the text of procurement contracts to classify purchases into homogeneous bins and thereby ensure that when comparing prices paid by bureaucrats and organizations across the country, they are buying the same type and quality of good. To estimate the causal impacts of individual bureaucrats and organizations on procurement performance they exploit the fact that many end-user organizations are observed working with multiple procurement officers and vice versa, providing a large number of quasi-experiments for identification.

procurers, where low numbers of bidders was an issue, but only 0.7% when implemented by the most effective quartile of procurers that were already able to attract many local bidders without the bid subsidies.

Bucciol et al. (2019) also study the role played by the quality of public buyers, studying a dataset of standardized medical devices purchased by local Italian public buyers (PBs). They again attempt to empirically investigate the impact of the heterogeneous ability/competence of public buyers (e.g. local public hospitals, health units) as a determinant of price differences in the procurement of standard medical devices. To isolate the role played by public buyer's competence from that played by the seller's production costs and the degree of competition within auctions, the authors combine a simple structural purchasing model with an original dataset on Italian public procurement that provides the quantities purchased and price paid for standard medical devices sold to 135 local public hospitals and health units in Italy, in the period January–December 2013.[30]

They find, first, that the average prices of standard medical devices paid by different Italian PBs vary substantially. On one occasion, the price for one unit of a syringe ranged from between €0.05 and €0.17, depending on the buyer (Bucciol et al., 2019: 7). Second, they estimate that the differences across the PB's purchasing prices are explained by PB fixed effects, which in turn depend on institutional characteristics, geography, and size. In particular, the PB's size (measured by the overall personnel costs, corresponding to the sum of health and non-health personnel costs) has a general positive and significant effect on the ability to run the procurement process, controlling of course for the size of the purchases. When the authors disentangle health-related and non-health personnel costs, they find both to be significant but with opposite sign, while controls show that it is the non-health personnel costs that drive the overall positive and significant effect on the PB's ability. At the geographical level, the divide between north and south in Italy is confirmed in their empirical analysis. In the southern regions, the PB's positive size effect disappears at the regional level, and the non-health personnel costs have a negative sign.

The results highlight significant differences in procurement ability between the PBs of different organizational structures: local public health units record higher prices in purchasing standard medical devices than public hospitals. The latter have a more centralized procurement management than the former and are also more closely related to regional offices, where health policy is decided. Finally, they find that the adoption of a reference price as a cap to medical device prices has a non-linear effect on the PB's ability: it has a significant negative effect on high-ability PBs (i.e. it increases the procurement's average

30. Bucciol et al., 2019 first develop and estimate a structural economic model of medical device procurement to derive the unobserved marginal cost for each medical device. Then they collect functionally homogeneous medical devices with given characteristics in classes, and for each class, they set a common marginal cost. This is then used as a benchmark to compare the different prices different PBs pay when buying medical devices. Considering the PB's purchase of different (classes of) medical devices, the authors derive each PB fixed effect and use it as a measure of the PB's competence/ability to manage the procurement process. Then, exploiting information from local public hospitals' and health units' open balance sheet data, the authors investigate the determinants of the PB's ability to manage the procurement of medical devices. Finally, they also explore the introduction of a reference price and its impact on a PB's ability.

prices), no effect on medium-ability PBS, and a positive effect on low-ability PBS. The authors also, importantly, find that 'it is the non-health personnel cost that drives the overall positive and significant effect on the public buyer's ability' (Bucciol et al., 2019: 27). A policy recommendation based on these findings is that policy makers who aim to increase efficiency in procurement for standard medical devices 'should first carefully take into consideration each public buyer's ability in running the procurement process' (Bucciol et al., 2019: 27).

5.1.2 ECONOMIC STUDIES ON COMPETENCE IN COMPLEX PROCUREMENTS

In Decarolis et al. (2019b), we study whether more competent public bureaucracies contribute to better economic outcomes in the case of complex procurements. Little is known about the importance of procurement competence in more complex procurements, not least because it is very difficult to measure performance in these environments. This paper tries to take a step in this direction by focusing on works and services, which are typically more complex than goods. We use data from the US, probably the country with the most well-developed system of production and certification of procurement competences, which should provide a lower bound for most other countries.

We combine for the first time three large US databases: contract-level data on procurement performance in the Federal Procurement Data System (FPDS); bureau-level data from a survey conducted by the Office of Personnel Management since 2002 on federal employees, the Federal Employee Viewpoint Survey (FEVS); and Federal Workforce Data (FedScope), which contains information on characteristics of the public workforce at the employee level. To quantify the extent to which the government-bureau-level competencies determine procurement outcomes, we use the first database to construct procurement performance measures and the second dataset to build measures of procurement offices' competence. We then use the third database to construct instruments that help us address important endogeneity issues. Our identification strategy exploits the exogeneity of death events involving public officials to allow for a causal interpretation of bureau competence on procurement performance.

There are three main measurement challenges that our analysis needs to overcome. The first is how to measure procurement performance. Unit price comparisons have been used for standardized goods, but they are not suitable for the more complex procurements on which we focus, as they are heterogeneous in many non-recorded dimensions and their contracts are often incomplete. We use the Federal Procurement Data System instead to construct three proxies of performance based on time delays, cost overruns, and number

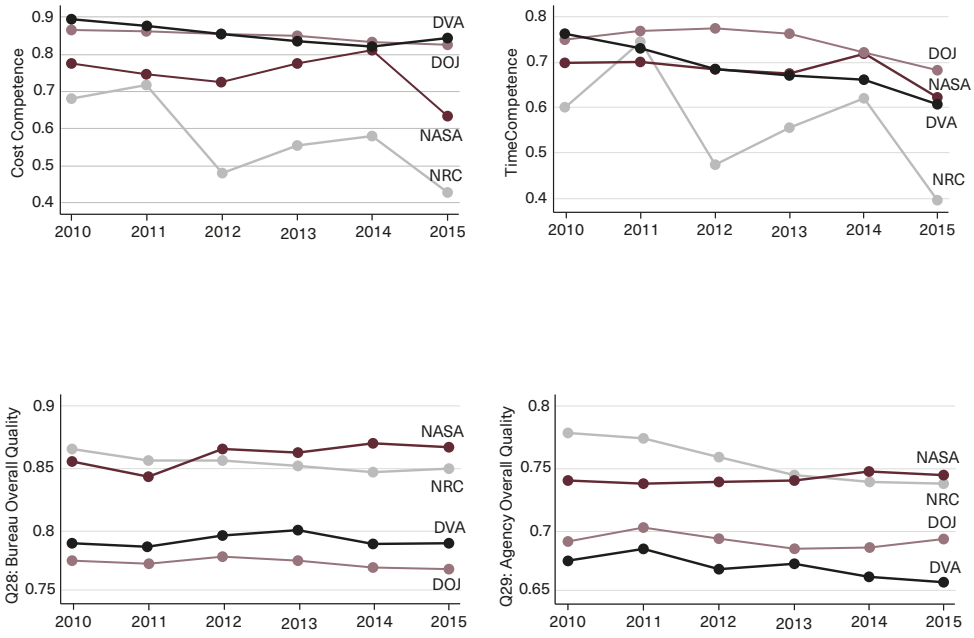
of renegotiations. Although the first two measures are widely used in the literature, we are careful to take into account that cost overruns and delays may be due to new or additional work requested by the public buyer, in which case they should not be viewed as indicative of a poor outcome. We therefore consider only those which have occurred to deliver the work or service that was originally tendered. The third performance measure, the overall number of renegotiation episodes, is new and aims at capturing Williamson's 'haggling costs', which are a pure deadweight loss present regardless of the reason behind the renegotiation, and which have been shown to be economically sizeable for complex contracts. Our data reveals a surprising and persistent heterogeneity along these three dimensions across US federal bureaus.

The second challenge is the measurement of bureaucratic competence. Other papers in the field have measured it using buyer fixed effects. We use a novel approach based on the mentioned survey of employees' subjective evaluations (FEVS). The survey is extremely rich, and we chose the most general question as an overall measure for competence (How would you rate the overall quality of work done by your work unit?). Responses to these questions should be seen as measures of the overall efficacy of the workflow and processes within the bureau, hence proxying for the ideal measure of competence on the many different aspects relevant to procurement. An extensive set of robustness checks support our idea of measuring competence through the FEVS data.

The third measurement problem is the association between more complex contracts and more competent buyers: the most competent buyers may consistently produce poor performance because they are allocated the most complicated procurements. This point is well illustrated by Figure 4 below, showing how the performance of the agencies that are worst in terms of competence (DVA and DOJ) is superior to that of the two most competent agencies (NASA and NRC) in terms of both time and cost performance. This striking inversion of the relative ranking is a key feature of the economic environment that we analyse and around which we construct our empirical strategy. More competence is associated with more complex contracts, which are intrinsically associated with higher levels of delays and cost overruns.

We therefore develop an instrumental variable strategy exploiting exogenous changes in competence. We use FedScope to build instruments for bureaus' competence based on deaths of specific types of employees: bureau managers and white-collar employees who are relatively young and earn a relatively high wage. The idea is that more competent offices adopt better managerial practices, routines, and processes that are more resilient to risks, such as an unexpected loss of a key employee, and less dependent on specific individuals. This is

Figure 4. Cost and time competence, overall quality, and bureau and agency level. National Aeronautics and Space Administration (NASA), Department of Justice (DOJ),Department of Veteran Affairs (DVA), Nuclear Regulatory Commission (NRC).
Source: Decarolis et al. (2019a).



precisely what the first stage of our IV strategy documents. Our instruments perform well in terms of their statistical properties and they allow us to estimate a causal effect of bureau competence on procurement outcomes.

We find that one standard deviation increase in competence reduces the number of days of delay by 23%, cost overruns by 29%, and the number of renegotiations by half. This implies that if all federal bureaus were to obtain NASA's high level of competence – corresponding to the top 10th percentile of the competence distribution – delays in contract execution would decline by 4.8 million days, and cost overruns would drop by $6.7 billion over the entire sample analysed. We also find a consistently negative effect of greater competence on the number of renegotiations: a one standard deviation increase in competence causes 0.5 (39%) and 0.8 (71%) fewer cost renegotiations and time renegotiations, respectively.

Finally, we try to understand what exactly makes a bureau 'competent', using the FEVS data to identify three different components: cooperation among employees, incentives, and skills. Separately estimating their causal effects is unfeasible with instruments like the two described above as the validity of the exclusion restriction, which can be argued to be satisfied when measuring a broadly-defined notion of bureau competence, is unlikely to hold for more specific components. However, we provide multiple pieces of evidence suggestive that cooperation is the key driver behind the positive effects of bureau competence. This finding conforms with the view that successful procurement requires the appropriate coordination of a multiplicity of tasks involving different individuals. We also consider the extent to which the role of cooperation is due to the presence of capable managers, able to lead a group to effective cooperation, exploiting the heterogenous effects obtained through instruments considering the deaths of different subgroups of employees. We find that the deaths that matter the most are those of relatively young and best paid white-collar employees.

These results point to the large potential improvement in the performance of public contracts that could be achieved by investing more resources in increasing the competence of contracting authorities, even in a country with long-established procurement training and certification institutions such as the US. In Europe, recent policy initiatives see the introduction of qualification systems for public procurers as a necessary response to the generally lower procurement competence coupled with the greater discretion granted by the 2014 Procurement Directive. Our results on the role of cooperation suggest that certification programs would also be useful at the level of the procuring office, and should include features such as the organization of the acquisition process and the prevailing management practices, as is often done for private firms.

In Decarolis et al. (2019b), we empirically analyse whether innovation outcomes respond to procurement competence in the public sector, and we explore this question within the context of US federal R&D procurement contracts. The Department of Defense, which awards 85% of the contracts in our data, is known to actively pursue strategic decisions throughout all acquisition stages, from planning to award and oversight. Nevertheless, due to concerns about self-dealing, this environment still involves rigid procedures for the selection of private contractors and their subsequent monitoring. The main goal of this study is to achieve an accurate measurement of the impact of shocks on the management of public offices – in the form of deaths of their relevant employees – on detailed, contract-level measures of innovation.

A key ingredient of this study allowing us to make pro-

gress on the research question is a new dataset obtained by the combination of four data sources. First, we use the 3PFL Database of Federally Funded Patents (3PFL), as collected by de Rassenfosse et al. (2019). It links information on patented inventions (namely, the number of patents, their associated citations and claims) induced by a US federal procurement contract of R&D to the FPDS dataset. Although only a small share of contracts involving R&D produce patents (5.34%), a few of them (31.7%) produce more than one patent. Second, as in Decarolis et al. (2019a), we use the Federal Procurement Data System (FPDS), which contains information (e.g. awarding bureau, price, product or service code, contract amount, contract type, contractor features, etc.) on every contract awarded by US federal agencies worth more than $3,000, but this time not to construct performance measures. The last two datasets are also used in Decarolis et al. (2019a) and cover features of the public offices: FedScope, which reports fine statistical information on the entirety of the public workforce, produced by the Office of Personnel Management and made publicly available through the Federal Human Resource database; and the Federal Employee Viewpoint Survey (FEVS), which measures government employees' perceptions on several characteristics of their agency and specific office.

Our empirical methodology again exploits the observability of deaths of federal managers as a source of variation. In the spirit of the long, established literature in economics and management using this identification strategy (for a recent overview, see Jäger, 2017), we are careful in determining when death events can be considered exogenous and how to interpret the estimated effect of a manager's death on the innovation outcomes. We look at deaths of 'relevant employees' in the six months preceding the contract start date, which corresponds to the period during which contractor selection takes place. Their deaths might matter through a number of channels: they might induce a temporary shortage of skilled workers in the office, or cause emotional distress among the remaining workers, or induce power vacuum politics or, simply, cause a work overload due to unexpected labour shortfall or, likely, a combination of all of the above.

We do not seek to tell apart each of these mechanisms. Instead, we exploit the richness of our data to offer insights on the overall role played by public buyers in the procurement of innovation. We find a strong negative impact of unexpected manager deaths occurring in the six months before the contract is awarded on all our innovation outcome measures: an increase in managers' deaths equivalent to 1% of bureau-state-specific number of white collars, causes a decline of 4.3% of patents per contract, 3.8% patent citations per contract, and 8.6% patent claims per contract. The smaller the workforce size of the bureau, the stronger the effect. By

contrast, we find a considerably weaker, though still positive and statistically significant, effect of unexpected managers' deaths occurring during the contract management phase that follows the contract's award.

Similarly, no effects are found when the death events involve employees less likely to cover management roles.[31] This is suggestive that the effect of relevant managers is not merely loaded into the selection of the contractors but involves additional activities that, most likely, take place before the tender, such as need assessments and market evaluations. Consistently with these results and with Decarolis (2019a), we also find that bureaus where employees perceive a high level of cooperation within the office are associated with better R&D outcomes. This latter effect is only direct, not through an interaction with the deaths of bureau managers, and suggests that cooperative management practices are central to successful innovation procurement. Neither direct nor indirect effects are found instead for the level of skills and incentives within the bureaus.

Overall, these results represent a clear indication of the importance of focusing on buyers when trying to improve the value-generating potential of innovation procurement. In particular, we confirm, in a different context, an important insight of Bruce et al. (2019, discussed in Section 5.2): in a public-private relationship, it is not enough to design schemes creating the right incentives for the public officials; it is also essential to have competent public officials. Offering a precise quantitative estimation of this value driver is an important contribution of the present study.

Results on the greater importance of the pre-award phase and of the role played by cooperation are consistent with the complexity and highly interdisciplinary nature of procurement design, which requires combining legal, technical, and market expertise of multiple subjects, even more relevant in the case of a complex procurement object such as innovation. Given the crucial role of innovation in fostering economic growth and the high share of innovation procurement originating from public bodies, these benefits have the potential to create significant public value. It is therefore important to show that even within an organization with highly competent procurement officials like the US Department of Defense, and despite the rigidities of public procurement, there are still ample margins for improving procurement outcomes through more competent public management.

31. The results are robust to the inclusion of bureau and contractor fixed effects and are qualitatively stable across various model specifications and subsamples. They are also robust to different ways of conducting inference through either one- or two-way clustering and robust standard errors.

5.2 Management Literature

Outside of the economic literature, there are studies in management science that similarly highlight the importance of competence. Grennan (2014), for example, focuses on markets where buyers and suppliers negotiate, and tries to quantify the effects of different buyers' competence in negotiating – or bargaining ability – on the price paid for the same goods or services, isolating it from other main price determinants such as costs, willingness to pay, and competition. He uses a model of buyer demand and buyer–supplier bargaining, combined with detailed panel data on prices and quantities at the buyer–supplier relationship level, to estimate these bargaining abilities for US hospitals' procurement of coronary stents, where different hospitals (buyers) pay very different prices for the exact same product from the same supplier. His dataset covers the quantity of purchases and prices paid for all coronary stents sold to 96 US hospitals between January 2004 through June 2007 at the stent-hospital-month level of observation. Grennan (2014) then estimates that the variation in bargaining abilities explains 79% of this price variation, and shows that bargaining ability has a large firm-specific component. He also documents that the distribution of bargaining abilities across hospitals changes considerably over time, which suggests that this form of procurement competence can be learned and transferred across organizations.

Cabral (2017) uses a dataset of 1,472 service contracts in Brazilian public universities from 2003 to 2012 to study the role of organizational capabilities, and in particular procurement officials' 'contract management capabilities', which is what we refer to as procurement competence, in alleviating the potentially negative effect of a policy intervention aimed at favouring smaller contractors on procurement outcomes. In 2007 Brazil introduced new legislation favouring small and medium-sized enterprises (SMEs) in public contracting, enabling observations of contract allocation and performance before and after the new legislation.

Cabral (2017) identifies the impact of the exogenous intervention and the moderating role of public managers' capabilities, focusing on price savings – discounts on estimated contract value – and delays in the procurement process. Estimation results point to a significant role of procurement officials' contract management capabilities in maintaining high levels of procurement performance after the implementation of the government policy. They support the author's hypothesis that the higher the level of public managers' contract-management capabilities, the higher the likelihood of positive effects of policy interventions in public contracting on government-level outcomes (savings and lack of delays in the procurement process). The results also support his second hypothesis that

the higher the level of public managers' contract-management capabilities, the higher the likelihood of enhancing the positive effects of policy interventions in public contracting on firm-level outcomes (ex-post performance, proxied by sanctions for poor performance) (Cabral, 2017: 848).

Finally, Bruce et al. (2019) study the choice between different contractual arrangement for the procurement of R&D in the US and the role played by the technical competence of the procurement office in determining this choice and the following procurement outcomes. Some contracts leave the government with greater discretion and monitoring ability on post-award projects' progress than others. Using novel data on R&D contracts and on the technical expertise available at specific government bureau locations, they show that contracts that leave the government more discretion and oversight during the execution phase are more likely to be used for early-stage projects and those for which local government scientific personnel have relevant technical expertise; and that in turn, these agreements yield greater innovative output as measured by patents, controlling for endogeneity of contract form, results that highlight the importance of the procurement bureaus' competence for the success of procurement of innovation (Bruce et al., 2019).

More specifically, the authors start from three empirical predictions about public contracting for R&D based on contract-theoretic reasoning: i) as contracting hazards increase due to project complexity and uncertainty, the government agency is more likely to include an information exchange and own decision-rights mechanisms in the contract; ii) these mechanisms will only be implemented if the government agency has employees with the competence necessary to make effective and appropriate project decisions on the subject matter; and iii) conditional on project uncertainty and government expertise, agreements with such decision rights will be more successful at generating patented innovations because of more effective monitoring of private sector R&D efforts by the government (Bruce et al., 2019: 535).

To test these predictions, the authors use a sample of more than 4,000 R&D contracts between US federal agencies and private firms, and data on the technical expertise of government agency personnel located in geographic proximity to the firm's R&D site. The contracts between the agencies and private firms take two forms: a 'grant', which affords the government no in-process decision rights, and 'a cooperative agreement', which gives government employees substantial in-process decision rights. The authors find support for their initial hypotheses, as the empirical results show that: (a) earlier-stage projects (which are more likely to entail greater uncertainty) are more likely to be governed by cooperative agreements rather than grants; (b) agencies rely on coopera-

tive agreements more when they have the relevant technical capabilities near the R&D site; (c) cooperative agreements perform better than grants (measured in terms of patents generated and the citations of these patents); and (d) that although cooperative agreements perform better than grants overall, the projects in which grants were awarded would not have been more productive had they been organized as cooperative agreements (Bruce et al., 2019: 535).

The study confirms the crucial importance of having competent contracting authorities and officials for the success of the procurement of innovation. In particular, they highlight the importance of a government overseer's ability to understand the development of the R&D project, evaluate the effort of the private provider, and interact with the latter, including intervening whenever necessary in the contract execution phase.

6. Procurement Competence Frameworks in the US and UK

THIS REPORT HAS EMPHASIZED several reasons why it is important to have competent public procurers, and the large potential waste caused by the lack of procurement competence, in terms of high prices, low quality, wasteful renegotiation, and lack of innovation. We have not yet addressed, however, the question of how to develop and sustain public procurement competence. The last part of this report offers an overview of examples from the US and UK in answer to this question.

For a long time in the US and the UK, and increasingly in Europe, training programs are being developed, and certificates and degrees are being awarded in the field of procurement. In the US and the UK specific, certified levels of training allow procurement professionals to take on tasks corresponding to their training and level of expertise and to be rewarded accordingly. To induce people to invest in developing procurement competence, they need to be ensured that they will be rewarded for their investment. Proper educational programs need to be available. Certification is needed to ensure the high quality of these programs. Finally, high quality education that produces good procurement outcomes needs to be rewarded with better career outcomes.

In this section we provide an overview of how procurement competence is developed and appropriately sustained and rewarded in the US and the UK. For these two examples, we cover how procurement competences are developed and taught and then certified, which institutions offer the necessary training, what career benefits certification and degrees entail, and what courses and topics are offered. We then consider a specific master's course from the University of Tor Vergata in Rome, chosen by the European Bank for Reconstruction and Development as main partner for creating new procurement training programs in other countries.

6.1 Procurement Competence in the United States

The US has a structured system of incentives, certifications, and educational programs. Several job titles within public procurement are defined in various laws and policy memos. These include such positions as Contracting Officer, a role specified in the Federal Acquisition Regulation (48 CFR, Part 1.602-2): 'Contracting officers are responsible for ensuring performance of all necessary actions for effective contracting, ensuring compliance with the terms of the contract, and safeguarding the interests of the United States in its contractual relationships'. Contracting officers can bind the US government to contracts that exceed the Micro Purchase Threshold. This threshold was $3,500 until 2018, when the threshold was set to $10,000 by a memorandum (with some restrictions for specific procurement areas) (General Service Administration, 2018). Another position is that of Acquisition Career Manager (ACM). The main responsibilities of ACMs include to managing 'the identification and development of the acquisition workforce; including identifying staffing needs, training requirements, and other workforce development strategies' (FAI, 2018: 2). Beyond these, there are several other titles, such as Chief Acquisition Officer, who is appointed by the head of the purchasing agency and manages acquisition activities.

One of the central institutions within procurement in the US is the Federal Acquisition Institute (FAI), which is located within the General Services Administration and receives policy directions from the Administrator of the Office of Federal Procurement Policy (OFPP). FAI's legislative authority and responsibilities are outlined in the Office of Federal Procurement Policy Act (41 U.S.C), and include:

- Promoting the development of a professional federal acquisition workforce.
- Supporting the heads of executive agencies in their efforts to manage and develop a professional acquisition workforce.
- Administration of the Acquisition Workforce Training Fund.[32]

FAI also develops certifications in the US. There are three kinds of certification: Federal Acquisition Certification in Contracting (FAC-C), Federal Acquisition Certification for Contracting Officer's Representatives (FAC-COR), and Federal Acquisition Certification for Program and Project Managers (FAC-P/PM). As an example of how demanding these certifications are, consider the FAC-C Certification Training Requirements (as of 1 October 2019):

32. The Acquisition Workforce Training Fund is financed by deposits of 5% of the fees collected by non-Department of Defense executive agencies under government-wide contracts.

› FAC-C Level 1 requires one year of contract work experience based on the Contract Specialist (GS.1102) Qualification Standard. A Baccalaureate degree from an accredited institution or 24 semester hours of business-related college courses, and the completion of ten core courses.
› FAC-C Level 2 requires two years of contract work experience based on the Contract Specialist (GS.1102) Qualification Standard. A Baccalaureate degree from an accredited institution or 24 semester hours of business-related college courses, and the completion of an additional eight core courses, and all training required for Level 1.
› FAC-C Level 3 requires four years of contract work experience based on the Contract Specialist (GS.1102) Qualification Standard. A Baccalaureate degree from an accredited institution or 24 semester hours of business-related college courses, and the completion of an additional two core courses and one elective course, and all training required for Level 1 and Level 2.

In order to maintain FAC-C certification, contracting professionals must earn 80 continuous learning points every two years. This continuous learning is monitored by the agency's acquisition career manager. As FAC-C certifications are processed and approved by the federal agency of the individual, FAI emphasizes coordination with the career acquisition manager before enrolling in any courses, as specific agencies may have specific needs.

There are several master's programs and FAI-accredited institutions in the US. One example is George Washington University's Master of Arts (MA) in Government Contracts, which requires the completion of 36 credit hours comprised of eight core classes for a total of 23 credit hours, and law or business electives for a further nine credit hours. We surveyed several master's programs accredited by FAI, and the courses typically include:

› Contract Pricing
› Contract Evaluation and Award
› Federal Government Contracting
› Legal Considerations in Contracting
› Contract Management
› Contract Execution
› Contract Planning
› Contracting for Decision Makers
› Government Contract Law

As for career incentives, the FAC certifications are prerequisites for advancing on the US federal pay scale, the 'General Schedule' (GS). More than 70% of US federal employees are paid according to this scheme, and all federal agencies shall accept FAC-C certification as 'evidence that an employee meets the

applicable core education, training, and experience requirements for the general schedule (GS)-1102 series' (Office of Management and Budget, 2006: 1). These certifications are therefore not optional for public procurers.

6.2 Procurement Competence in the United Kingdom

In the UK, the 'Competency Framework' sets out the skills, behaviours, and competences which civil service procurement professionals should demonstrate in delivering highly efficient, dynamic, and professional procurement and commercial operations that deliver value for money to the taxpayer (Government Commercial Function, 2015). This framework is what drives the content of the professional curriculum for the procurement profession.

Certification in the UK is primarily carried out by the Chartered Institute of Procurement and Supply (CIPS), which was established in 1932 and is the largest procurement professional body in the world, with over 76,000 members. CIPS lists over 50 educational institutions with accredited degrees and programs, and offers five different levels of certification, from entry level to senior certifications (CIPS, 2020).

An example of a programme accredited by CIPS is the University of Salford's online Master of Science in Procurement, Logistics, and Supply Chain Management. The duration of this programme is a minimum of 12 months and a maximum of three years. Another example is Anglia Ruskin University, which has CIPS accreditation for their MSc in Supply Chain Management, consisting of the following courses:

- Supply Chain Strategy and Operations
- Sustainable Supply Chains
- Research Methods for Business and Management
- Human Resource Management and Leadership
- Managing Supply Chains in Practice
- Supply Chain Performance Management
- Strategic Management
- Project Management
- Postgraduate Major Project

Professionals with the MCIPS qualification earn more per annum than those without MCIPS, and can earn over £150,000 more in their professional life than those who are not certified. Certification also enhances career prospects: over 50% of job vacancies advertised in Supply Management specify candidates should have or be studying towards CIPS qualifications. Further, in a survey of job advertisements in the UK, we found that most public bodies required various levels of CIPS certification. Recent job advertisements in public procurement

at the South Lakeland District Council, the Department for Work and Pensions, the Newcastle upon Tyne Hospitals NHS Foundation Trust, the UK Ministry of Defence, the UK Atomic Energy Authority, and several others all require specific levels of CIPS certification.

6.3 Procurement Competence in Sweden

In this section we briefly survey the procurement training opportunities available in Sweden, looking at previous reports and through Google searches. We conclude that there are rather limited opportunities that can be broadly categorized into three kinds: university courses, vocational education programs, and private courses.

First, there are master's programs in 'offentlig förvaltning' or 'public management'. Gothenburg University has a master's in 'offentlig förvaltning', for example.[33] The detailed description of this degree, however, does not mention procurement.[34] Gothenburg University does have a course consisting of 15 högskolepoäng (HP) in procurement law. The university annually accepts 40 students to this course (it is also one of the most sought-after courses within the law program) (SOU, 2013: 200).

Stockholm University has a programme in 'statsvetenskap med inriktning mot offentlig politik och organisation', which includes a 7.5HP course in public procurement.[35] There is also a course on public procurement consisting of 15HP at the institution of law. However, apparently there were also plans to develop a more comprehensive programme in the area in cooperation with several institutions (technical, economic, etc.) to establish a more advanced programme for public procurement (SOU, 2013: 200). We have not been able to find any further developments on this, however. At Umeå University, a procurement course is included as an integrated part of the law program. Procurement as a subject is also included in several elective courses. The institution of law has also started to prepare a master's programme in public procurement. Presently, to our knowledge, there is no programme in public procurement, and no courses of more than 30HP, which are in turn integrated into programmes in public administration or law.

Second, there are higher vocational education programmes. Stockholms Internationella Handelsskola offers a higher vocational education programme in public procurement. The programme takes two years of full-time studies to complete, and enables participants to work as procurers and purchasers, procurement strategists, or procurement controllers.[36] Frans Schartaus Handelsinstitut lists a similar vocational program,[37] as does Göteborg's yrkeshögskola.[38]

33. See https://spa.gu.se/utbildning/master.
34. See https://spa.gu.se/utbildning/master/kurser.
35. See https://www.statsvet.su.se/utbildning/våra-utbildningar/avancerad-nivå/masterprogram-med-inriktning-mot-offentlig-politik-och-organisation.
36. See https://sih.se/utbildningar/offentlig-upphandlare/.
37. See http://www.schartau.se/yh-utbildningar/offentlig-upphandlare.html.
38. See https://yrgo.se/utbildningar/ekonomi-och-administration/offentlig-upphandlare.

Third, there are private institutions offering courses. Colligio offers the course 'Diplomerad Upphandlare', which costs 43,900 SEK.[39] The programme involves courses on procurement law, the procurement process, evaluation, demand specification, direct procurement, delivery and follow up.

As for certifications, Sveriges Offentliga Inköpare offers a certification for public procurers.[40] However, to our knowledge, this certification is at most discretionarily recognized by purchasing agencies in Sweden.

These training opportunities are not comparable to the US or the UK and can be extended and improved upon. Sweden has recently recognized the importance of public procurement and established the 'National Agency for Public Procurement', or Upphandlingsmyndigheten, in September of 2015. The national procurement strategy (Regeringskansliet, 2016) is an important step in the right direction. There are also other initiatives by Upphandlingsmyndigheten, such as participation in the Horizon 2020 project 'Procure2Innovate', which involves establishing competence centres for innovation procurement (Upphandlingsmyndigheten, 2018b: 16). There have also been other initiatives: to increase competence with respect to procuring food and meal services, for example.

At the same time, in our judgment, the strategy does not emphasize enough the need for improved competence that has been documented by several previous reports – a concern now substantiated by a growing academic literature on the importance of competence in public procurement. This, we believe, is a crucial aspect of improving the effectiveness of public procurement.

The National Procurement Strategy lacks several of the features in the UK and US competence frameworks, where certification levels are integrated in the competence framework and correlated with coursework. Competence, university training, and certifications are not mentioned in any of the seven 'policy objectives' in the national procurement strategy.

As for career paths, there is no clear framework of career advancement and certifications expected of procurers in order for them to advance in their careers, nor clear limitation about what a public servant can buy without specific procurement training. In a shorter survey of job advertisements in public procurement at Arbetsförmedlingen, we find that most postings emphasize that the applicant has knowledge of Lagen om Offentlig Upphandling (LOU), some postings require previous experience in public procurement, and others require specific technical skills and knowledge of sector-specific contracts (such as infrastructure). To our understanding, procurement training in Sweden is to a large extent about the law – it focuses largely on what the law says is legal and illegal, but offers little guidance on how to effectively design and manage procurements within the boundaries of the law. As

39. See https://www.colligio.se/utbildning/diplomerad-upphandlare/.

40. See http://www.soi.se/wp-content/uploads/SOI-koncept.pdf.

the research discussed earlier shows, one can waste enormous quantities of public money and lower quality while engaging in poor procurement processes that respect the law – good procurement needs many more skills in addition to legal ones.

There are 3,089 public procurers within public administration in Sweden. The average public procurer is between the age 45–54, working in a state organization, and has a post-gymnasium education within societal studies, law, business, or administration (Upphandlingsmyndigheten, 2018b: 6). If the post-gymnasium education that many in the public procurement sector have were more focused on topics specific to public procurement, then the general level of competence would increase. Increasing the number of persons with specific public procurement training would likely have a positive effect on efficiency and quality. Due to the local nature of most public procurement,[41] such training opportunities are best designed at the national level – where educational opportunities are presently lacking.

That said, we note again that public procurement is a broad and complex topic that goes way beyond what is legal or not. In Italy for example there is a master's programme in public procurement that does not consider national aspects, such as local laws, but instead focuses on broader issues that are of relevance regardless of national circumstances. This highlights that there are a lot of possible training opportunities that could be offered, even without considering nation-specific legislation. Further, large projects will be subject to the EU procurement directives, which still constitute a substantial part of procurement spending. It may therefore be useful to consider how such a programme could be designed in practice.

41. 'Only one out of three calls for tender are covered by the [EU] public procurement directives in Sweden' (Regeringskansliet, 2016: 7).

6.4 Tor Vergata's Master Programme in Public Procurement

The Tor Vergata International Master's in Public Procurement Management (IMPPM), whose 8th edition runs in 2019–2020, was established as a joint venture between the university and the European Bank for Reconstruction and Development (EBRD). They now aim to export their professional and training capacity throughout the globe, and they now receive active support from the European Investment Bank, the African Development Bank, and the United Nations.

The programme is characterized by interdisciplinary content and is meant to attract purchasers with relevant experience in procurement as well as students interested in preparing for a career in procurement. The programme started with a competition 'MEF Consip Master in E-Procurement' in 2004, organized by the Italian Ministry of Economy and Finance

together with Consip, the Central Purchasing Body in Italy. The competition concerned the organization of a master's degree in e-procurement, where all Italian universities were invited to participate. This original master's in e-procurement was eventually reorganized through the creation and development of the Italian Master's in Procurement Management, and then the International Master's in Public Procurement Management was created.

The master's is a one-year programme (60 ECTS) and consists of a classroom period in Rome between February and July, preceded and followed by two distant learning modules. Each module has a duration of 30 hours, and the programme also includes a mandatory professional internship and the preparation of a final dissertation.

Applicants must have either an Italian (two years) MSc degree, or an equivalent foreign university degree. Applicants must also have at least five years of prior work experience in procurement (only a limited number of applicants who have recently graduated with little experience will be taken into consideration).

The programme consists of around 13 modules, with courses like Negotiation and Team Building, Planning and Management of Procurement, Economics of Procurement, Competition and Procurement, Contract Complaints and Disputes, Law & Economics of Public Private Partnerships. Students in this programme will directly improve their ability to:

- Decipher and utilise competitive supply strategies
- Improve strategic outsourcing
- Create innovative supplier pricing models
- Efficiently assess potential suppliers
- Capitalize on e-procurement instruments
- Reduce company costs while improving product quality
- Encourage ethical behaviour through the use of best practice principles and transparency

On the master's program webpage, all information on class materials, modules, lectures, and the like are available. This could be a useful resource if a similar programme is considered in Sweden.[42]

42. See http://www.masterprocurement.eu/home/.

7. Conclusions and Recommendations

IN THE LAST SECTION, we briefly considered current training opportunities available in Sweden. In this section, we provide some recommendations on how to improve competence in public procurement in Sweden based on OECD and EU recommendations, the experiences of the UK and US, and previous reports on procurement in Sweden.

Sweden has, in comparison with the UK and US: i) very limited training opportunities in the form of master's programs at the university level, ii) no structured and widely recognized certifications for public procurers, and iii) a lack of incentives and a proper career path to make a master's in public procurement worthwhile for prospective students. The lack of procurement competence in Sweden has been recognized previously, as in SOU (2013):

> Good deals [in public procurement] requires knowledge and competence within several areas, such as law, economics, technology, environment, and social responsibility. This report believes that competence should be strengthened through education at the academic level. Such education exists today primarily in the form of different law courses. Here a broadening must take place and include knowledge from several disciplines. Of most importance is also that the education for leaders in the public sector provides room for public procurement, from the perspective of leadership and strategy. [...] To conclude, it is urgent to broaden research with the purpose of deepening the analysis but also to contribute to increased competence.[43] (SOU, 2013: 23)

The report further recommended:

› The government works out and turns over to parliament a strategic plan of action for good public deals with the

43. 'Att göra goda affärer kräver kunskaper och kompetens inom flera områden, exempelvis juridik, ekonomi, teknik, miljö och socialt ansvarstagande. Upphandlingsutredningen anser att kompetensen bör stärkas genom utbildning på akademisk nivå. Sådan utbildning finns i dag främst i form av olika juridiska kurser. Här måste en breddning ske och inkludera kunskap från ett antal discipliner. Av största vikt är också att utbildningen för ledare i offentlig sektor ger utrymme åt offentlig upphandling, utifrån perspektivet ledar-skap och strategi. [...] Det är sammanfattningsvis angeläget att bredda forskningen med syfte att fördjupa analysen men också att bidra till en höjd kompetens'.

main purpose of guiding public procurement toward better quality and effectiveness,
- Public procurement, with focus on leadership and strategy, is integrated in competence development of leaders in the state,
- Three professorships should be instituted within public procurement, focusing on law, economics, and social science but also task-education within the area is arranged.
- The grants to research on public procurement is extended with 10-15 million SEK per year and interdisciplinary research is given priority,
- Coordinated support for procurement headed by the state is given the responsibility to develop guidelines and informational efforts on the strategic significance of procurement, and
- The coordinated procurement support develops special guidance for purchasing coordination.[44] (SOU 2013:12)

To our knowledge, these areas have been paid insufficient attention since the 2013 report. No procurement courses have been created nor have professorships been funded in the area of public procurement, at least to our knowledge. Konkurrensverket did receive an increased budget to assist in procurement issues, but the follow-up to the national procurement strategy does not mention educational institutions, certificates, master's programs, etc. Our recommendations, in light of this, is merely to reemphasise the need for i) sustained political support and a competence framework for the development of procurement competence, ii) the importance of developing competence through advanced training at the academic level, iii) coupling this training with certifications for different levels of capability. Further, universities, purchasing agencies, politicians, and certification institutions need to coordinate to recognize new needs in public procurement, to develop and renew the competence framework, and to change courses required for certifications as needed. This is currently how the US and UK develop their procurement competence.

At the political level, Sweden could also consult the recommendations of the OECD (2015, 2016) and EU (2017/1805). For example, the OECD (2016: 6) proposed eight steps to implement an efficient capacity building strategy, including the creation of a steering committee, assessing the public procurement workforce, identifying goals, finding appropriate training solutions, drafting a strategic action plan and designing educational programs, drafting a training action plan, financing the strategy, and then monitoring, adapting, and learning from the results. An earlier set of recommendations issued by the OECD (OECD, 2015: 11) suggest that to develop a procurement workforce with the capacity to continually deliver value for money efficiently and effectively, states should i) ensure

44. 'regeringen utarbetar och överlämnar till riksdagen en strategisk handlingsplan för goda offentliga affärer med det huvudsakliga syftet är att styra den offentliga upphandlingen mot bättre kvalitet och effektivitet,

offentlig upphandling, med fokus på ledarskap och strategi, integreras i kompetensutvecklingen av ledare i staten,

tre professurer inrättas inom offentlig upphandling med inriktning på juridik, ekonomi och samhällsvetenskap samt uppdrags-utbildning inom området anordnas,

anslagen till forskning om offentlig upphandling utökas med 10–15 miljoner kronor årligen och tvärvetenskapliga projekt ges prioritet,

ett samordnat upphandlingsstöd i statlig regi ges ansvaret att utveckla vägledningar och informationsinsatser om upphandlingens strategiska betydelse, samt

det samordnade upphandlingsstödet utarbetar särskild väg-ledning för inköpssamverkan'.

that procurement officials meet high standards for knowledge; ii) provide attractive, competitive, and merit-based career options for procurement officials through the provision of clear means of advancement; and iii) promote collaborative approaches with knowledge centres such as universities, think tanks, or policy centres to improve skills and competences of the procurement workforce.

At the European level, the European Commission published official recommendations on the professionalization of public procurement in October of 2017 (EU 2017/1805). These emphasise that the professionalization of procurement should count on high-level political support, meaning the clearly defined assignment of responsibilities and tasks to institutions at the central policy level, and 'supporting efforts at local, regional and sectoral levels, ensuring continuation across political cycles, using where appropriate, the institutional structures promoting specialization, aggregation and sharing of knowledge' (EU, 2017/1805: 2). In the context of developing human resources and improving training and career management, they recommend: frameworks for skills and competences to support recruitment and career management processes and in designing training curricula; developing or supporting the development of the initial training offer; at the graduate and post-graduate level and other entry-level career training, career structures and institutional incentives together with political support to develop strategic outcomes; recognition and certification schemes which properly identify and reward procurement functions; and drawing benefits from academic cooperation and research to develop a sound theoretical backing for procurement solutions.

Regarding educational opportunities, the government could sponsor and certify an advanced master's programme in public procurement management, for example structured in modules of one week per month – so that it can be taken by already employed civil servants – possibly at reputable institutions like KTH or Stockholm University. KTH may be particularly suitable, as they currently have courses in Logistics and Supply Chain Management, covering many important topics such as supplier selection and evaluation, performance measures, E-purchasing, and (private) contracting in supply chains. Further, one of Statens väg- och transportforskningsinstitut's (VTI) offices is located at the KTH campus. Building upon and integrating advanced courses for private sector procurement may be the best way to proceed.

To make such training attractive, skilled procurers need to be rewarded, and career paths need to be available and visible to students. Courses should ideally be correlated with and count toward certain levels of certification. Upon completion of an accredited program, the education should be recognized in the form of eligibility for more senior positions,

the assignment of more complex tasks, and a higher wage when public institutions engage in the hiring of procurement professionals. As advanced procurement professionals will be attractive to the private sector, the public sector needs to offer higher wages to retain competent employees. As discussed earlier, available research suggests that the benefits from this investment – in terms of both price and quality of public services – are likely to be several orders of magnitude greater than its cost.

Regarding certifications, Sweden should consider implementing certifications correlated with coursework as is the case in the US and UK. Degrees and certifications in procurement are directly recognized in the US and UK through better employment opportunities, proven higher wages for certified procurers, and access to higher paygrades that necessitate a certification.

The law professor and procurement law expert Olle Lundin commented that 'there are no laws against incompetence' on a case where one pair of socks had cost up to 6,000 SEK when purchased by SLL (Säfvenberg, 2016). While the US and UK also do not have laws against incompetence *per se*, they use training and skills certification to avoid leaving large procurements in the hands of individuals without the necessary advanced procurement competence. If the price of a pair of socks can reach 6,000 SEK, in light of the research surveyed in this report it is not hard to imagine how much incompetence can cost in relation to large infrastructure projects.

A related question is whether small municipalities and local authorities that lack such advanced competences should be allowed to perform large, complex procurements. The efficiency-based answer is an obvious 'no', unless assisted (and supervised) by other another authority with that competence, such as a central purchasing agency or a specific technical unit in the central government. The question of procurement centralization, however, raises delicate political issues regarding federalism and the degree of autonomy of local communities, topics outside of the scope of this report.

To include a related example with which we are familiar, Italy is currently trying to introduce a mechanism that does not allow contracting authorities without enough competence and expertise to perform certain complex procurements, and a rating system for public buyers that would also limit what they can buy autonomously if they performed poorly in the past. One could think that some projects, like NKS, may be regarded as too complex to be carried out by decentralized regional entities, unless assisted (and supervised) by competent central agencies or technical units.

Our recommendations mostly reemphasize what has been already suggested by several previous investigations, now supported by much stronger academic evidence and the experi-

ences of other countries. Available research reviewed in previous chapters suggests that in a country like Sweden, improved competence in public procurement may save large amounts of taxpayer money per year and substantially improve the quality of procured goods and services. If the amount of procurement and its complexity continues to grow, then unless there is an urgent investment in competence, all the problems discussed in this report will worsen – potentially generating even greater losses of taxpayer money.

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PUBLIC PROCUREMENT is a complex activity that – while respecting legal requirements – can be performed poorly or well. Public buyers need to identify and explicitly formulate their needs, balance risks and incentives in the contract, as well as monitor the contractor and manage the contract during the execution phase, which is often long and paved with unforeseen events. If handled badly, public procurement can lead to substantial cost overrun, as well as deficits in the quality of the goods and services provided, some of which are crucial to long-term economic growth.

This report aims at informing the policy debate on what economic research suggests are the most likely causes and most effective remedies for public procurement failures. The author, *Giancarlo Spagnolo*, professor in economics at Stockholm Institute of Transition Economics (SITE) and former Head of Research at the Italian Central Procurement Agency (Consip Spa), concludes by offering practical recommendations on how to improve and sustain the level of procurement competence in Sweden.

Cost Overrun and Procurement Competence in Sweden is published as part of SNS research project Sustainable Urban and Rural Planning.

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