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Can governments use their construction contracts to improve training outcomes?

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ABSTRACT

This paper explores the likely efficacy of government agencies using their contracting relationships with private firms to affect training outcomes in the construction industry. Specifically, it reports on the results of a study of two training policies of the Western Australian government. Empirical data is drawn from the government's Tender Registration System between 1997 and 2006. The main finding of the quantitative analysis is that in the absence of strong industry commitment to policy objectives, the contracting approach is likely to result in high levels of avoidance activity and generate very few benefits. The results of a qualitative investigation also support these findings.

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1. Introduction

The basic principles of welfare economics require that the sum of the social costs of a policy intervention be justified by its contribution of social benefits. This paper explores the costs and benefits of a specific policy intervention: the leveraging of training outcomes on public construction projects. This intervention, which basically mandates minimum investments on training by contractors engaged in public works, is typically motivated by a desire to achieve the social and economic benefits associated with an increased supply of skilled construction labour. However, one of the potential costs of the intervention is a reduction in the amount of competition for these projects, with obvious consequences for average bid prices and choice. In jurisdictions, such as Western Australia, where construction market conditions have recently been characterised by a shortfall of tenderers and rising costs, this potential competitive effect is of particular concern. Further costs that may be involved with the inclusion of training objectives in construction contracts include costs of policy development, the administration and monitoring of contract performance, and, for contractors, costs associated with compliance and reporting.

This paper reports on the results of a case study of the effects of two training policies of the Western Australian government: the Priority Access Policy and the Building Skills Policy. Each of these policies aimed at ensuring an adequate supply of skilled labour in the construction industry.[2] The Priority Access Policy, first implemented in August 1999, required contractors to meet a range of minimum training requirements[3] before being eligible to tender on public building and construction contracts. The Building Skills Policy, which was first implemented in October 2002, specified that 10% of deemed labour hours be allocated to the employment of apprentices and/or trainees. On January 1, 2007, both policies were integrated into the Priority Start—Building Policy.

The quantitative parts of the study (summarised in Section 3) addressed a specific and important research question about the costs associated with these policies: did they have a detrimental impact on level of bid activity for public construction projects? This part of the enquiry was based on a unique set of data from the Western Australian Department of Housing and Work's Tender Registration System between 1997 and 2006. This enabled the identification of possible adverse competitive effects of the two policies in the Western Australian public construction sector.

The qualitative parts of the study (summarised in Section 4) addressed more widely-defined research questions about the range and magnitude of the costs and benefits associated with the policies. A wide range of contractors were interviewed in this part of the study. They provided detailed information on the costs

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[2] *Priority Access n.d.* Retrieved October 20, 2006, from http://policies.det.wa.edu.au/; *Building Skills n.d.* Retrieved October 20, 2006, from http://policies.det.wa.edu.au/.

[3] Contractors need to meet a minimum of 100 points in order for them to be able to tender. Points are allocated based on the contractor's involvement in specified employment and training activities, such as employing apprentices and/or trainees, staff with recognised VET qualifications, staff with tertiary qualifications, or having staff participating in work-related training programs.

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imposed on them as a result of the training provisions, as well as information on the effect of the policies on their training decisions. Policy officers in the key government agencies responsible for either sponsoring the policies or ensuring their implementation were also interviewed. This contributed important information on the rationale for the different policies and experiences with policy implementation.

The design of both the quantitative and qualitative parts of this study was informed by previous studies of the contracting out of government activities. As is outlined in Section 2, the number of empirical studies of the costs and benefits of policies that leverage training outcomes on public construction projects is very small. However, theoretical work within the tradition of principal-agent analysis and transaction cost theory, together with empirical work on the contracting out of a range of government services, was available to guide this study.

2. Literature

A number of theoretical and empirical studies have analysed the costs and benefits associated with the contracting out of government activities. As Jensen and Stonecash (2004) explain in their own literature review on this issue, most previous empirical studies of contracting out have attempted to measure the cost savings achieved through privatisation, as this was the focus of policy debate in the 1980s and 1990s. Relatively few studies have addressed the ability of contracting arrangements to ensure the delivery of desired 'quality' outcomes,[4] or the costs of achieving these outcomes via contracting arrangements.

2.1. Theoretical studies

As could be expected, the theoretical literature on the leveraging of training outcomes on public construction projects is very limited. However, a number of studies have developed frameworks and engaged in analyses that have some application to the issues under consideration. In the economics literature these papers are generally associated with applications of microeconomic concepts, especially those relating to what is known as contract theory or principal-agent analysis (see especially Alchian and Demsetz, 1972; Prendergast, 1999; Sappington, 1991).

Principal-agent analysis is an economic framework that can be applied to the contractual relationship between a public-sector works agency and their 'agents' (e.g. a construction company). As is typical of most microeconomic theory, this framework begins by setting out the objective functions of the two sets of players. For example, the public works agency is assumed to aim for the maximum possible net social benefit from its projects, whilst the construction company is assumed to aim for maximum profits. Principal-agent analysis then directs attention to the circumstances, which can cause contracts to be 'incomplete' in that they are unable to fully specify desired outcomes. As is elaborated on in the papers surveyed below, these problems can cause additional monitoring and transaction costs and encourage strategic, anti-competitive behaviour. This can cause the contracts to fail to realise the maximum possible net social benefit.

A particularly important aspect of this type of analysis relates to the difficulties encountered in designing a contract that fully specifies all the required quantity and quality outcomes, and, generally, result in a failure to realise potential social benefits.

Hart et al. (1997) develop a model, (hereafter the HSV model), which they use to explore the factors affecting the ability of a government agency to secure social benefits from the contracting out of a government service. The model relates to circumstances where contracts are incomplete and the government agency is interested in achieving the 'basic' contract outcomes (such as a desired public facility), as well as 'quality improvements' (such as training opportunities for local youth). These improvements are described as creating direct and effort costs for the contractor but social gains for the community at large. Thus, including improvements in the contract is likely to be associated with a higher price (see also Holmstrom and Milgrom, 1991).

Hart et al. (1997) model the factors affecting the negotiation of a price for quality improvements in public contracts. These factors include those relating to: (a) the relationship between a contractor's investment in the quality improvement and social outcomes (this will affect the willingness of the government to offer a higher price); (b) the relationship between the quality improvement and the contractor's costs of production (this will affect the contractor's willingness to supply the improvement); and (c) competition in the tender market (for example, 'tight' markets will tend to bid up the price of quality innovations).

A development of the HSV model by Bennett and Iossa (2005) identifies how issues relating to asset ownership may also affect the ability to secure quality improvements in a construction contract. They demonstrate that if a contractor expects to capture (or internalise) some of the benefits of a quality improvement then the residual value of the contract accruing to the firm will increase with the quality improvement. This increases the likelihood that the firm will make investments in quality and reduce problems associated with regulating these improvements.

A large literature on the economics of training (see especially Becker, 1975)[5] helps to elaborate on these particular relationships. In the case of training, the basic HSV model applies to those circumstances where the skills provided via the quality improvement are perfectly transferable (or 'general'). This leaves the contractor with little incentive to invest in training as the mobility of trained workers will limit the contractor's opportunity to recoup any of the training costs it incurs.

The Bennett and Iossa extension focuses attention on the alternative situation, where the skills produced by a training programme have at least some degree of specificity and/or the skills involved are general but the labour market is imperfectly competitive. In these cases, due to restrictions on the mobility of trained workers, the firm is able to capture (or internalise) at least some of the benefits of a training investment. This will increase the contractor's willingness to supply the training improvement as part of a construction contract, and reduce the need for regulation of this outcome.

Globerman and Vining (1996) take a different and less theoretical approach to the analysis of the contracting out of services. However, their paper provides a useful complementary framework to the HSV model, especially with regards the analysis of the impact of governance costs on the efficiency and organisation of contracts.

Central to Globerman and Vining framework are issues associated with task complexity (the degree of difficulty in specifying and monitoring the terms and conditions of a transaction) and contestability (the degree of potential competition in the market for the contracted good or service). If task involved in specifying and monitoring training outcomes, for example, is large and outside the sphere of a government agency's

[4] A notable exception is Domberger and Jensen (1997), which explored the ability of a public authority to ensure adequate investments in vehicle maintenance in its contractual arrangements for the provision of refuse collection services.

[5] An overview of this theory is available in most standard labour economics text. See, for example, Ehrenburg and Smith (2005, pp. 153–157).

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sphere of expertise, it may be unable to effectively design and negotiate desired contract outcomes. Jensen and Stonecash (2004) note additionally that the presence of uncertainty about desired outcomes is likely to result in higher tendered prices and/or an unwillingness to tender for projects.

In Globerman and Vining's (1996), contestability as a deterrent to opportunistic behaviour by contractors. It also creates an incentive for contractors to submit tender bids close to their marginal costs of production, reducing the agency's bargaining task in relation to desired quality outcomes. Rimmer (1994) concurs with this analysis, arguing that the contestability in the market should be one of the key factors considered before a project is outsourced (see also Reca and Zieg, 1995).

2.2. Empirical studies

There have been few empirical studies of the types of issues raised in this paper and, of those that have been conducted, there is only a limited ability to generalise their results. In the following paragraphs we summarise the literature relating to studies of the experiences of contracting government services.

Jensen and Stonecash (2004) provide a very useful overview of empirical studies of outsourcing. They describe how empirical analysis of outsourcing has mainly focused on cleaning and refuse collection (e.g. Edwards and Stevens, 1978) as, apparently, they are the most frequently outsourced government services, and also because the outputs from both of these services are fairly easy to measure. Other empirical studies have been conducted on industries associated with transportation services, the maintenance of heavy equipment, waste water treatment (e.g. Holcombe, 1991), fire protection services, prison management services, tax assessment services (e.g. Carver, 1989), and road and maintenance services (e.g. Blom-Hansen, 2003). Most (but not all) of these analyses provided evidence of reductions in expenditure following outsourcing.

Other empirical evidence reviewed by Jensen and Stonecash indicates that very few outsourcing projects turn out as expected. Supporting the proposition advanced in Section 2.1, this research apparently identified problems associated with incomplete contracts, ex ante cost uncertainties, the specification and measurement of output, and the inherent risk associated with all projects. The authors assert that contract design is one of the important factors in determining the success of outsourcing the provision of a government service.

The methodology generally used to determine the magnitude of any cost savings from the outsourcing of a government service involves a comparison of the cost of the public provision of a government service with that of the private provision. Most of the studies cited above as examples employed regression techniques to establish these comparisons. However, Jensen and Stonecash note that a number of difficulties are typically encountered in effectively implementing these methods. First, public-sector data on operating costs and outputs is typically lacking. Second, it is difficult to find comparable services provided in public and private sector environments. Third, the dynamic nature of most contractual relationships reduces the value of cross-sectional data.

Other work by Jensen (notably, Domberger and Jensen, 1997) provides a useful example of a case-study approach to the identification of the costs and benefits of outsourcing, especially with regards ensuring 'quality' outcomes. These authors examine outcomes from the outsourcing of refuse collection services and note that in this particular case effort can be either devoted to producing the refuse collection service or maintaining the refuse collection vehicles They found that in the cases where the government owns the refuse collection vehicles and leases them to the private provider, the private provider would have little incentive to maintain the vehicles to a standard that would ensure their economic life extended passed the length of the contract. Thus, to overcome this problem, where refuse collection services are contracted out, it is generally specified that the private provider should own the vehicles. They concluded that poor specification and lack of monitoring appeared to be the main causes of quality-shading investments (such as the failure to maintain vehicles) and that improved contract design and implementation could prevent quality-shading investments.

In summary, this literature review has identified a number of valuable theoretical and empirical perspectives on the issues associated with the current paper. Existing theoretical models help to define the key categories of factors that are likely to be relevant to the costs and benefits of leveraged training outcomes. These include: the relationship between training and the contractor's costs of production; competition/contestability in the tender market; the nature of the training involved with the project (general or specific); uncertainty about future product market conditions; and the complexity of the training task. The relationship between the various government agencies involved in the development and administration of training policies is also highlighted as a possible determinant of costs and benefits.

The empirical studies reviewed in this section generally provide limited guidance on the research questions of this project. Most previous empirical work has focused on the extent of potential cost savings from privatisation. Few studies have explored the impacts on quality of outsourcing and/or the efficacy of alternative contractual methods. This highlights the novelty of the material presented in the remaining parts of this paper.

3. Quantitative analysis

The unique data captured by the Western Australian Department of Housing and Work's Tender Registration System enables a quantitative analysis of one potentially important costs of policies, which leverage training outcomes on public construction projects: a reduction in competition for these projects. The theoretical papers reviewed in the preceding section identify that this impact will arise if contractors perceive that mandated training requirements add to their production costs and, thus, reduce the profitability of any tender bid. The empirical literature also reviewed in Section 2.2 suggests that this type of effect has not been measured in Australia before. This indicates that the data that now exists on tender bids and outcomes in most Australian jurisdictions has yet to be utilised by researchers.

3.1. Data and methods

The Tender Registration System (TRS) was implemented in 1996 as a way of recording the tender details of all WA government construction projects. The TRS database contains records on the details of each project: a description of the works to be undertaken; the location of the planned work; and the estimated pre-tender value of the project. The database also contains information on the number of tender documents requested for each project, together with details on each of the tenders received and the winning bid. As such, the TRS is a unique and comprehensive resource for examining changes and variations in bid activity in an important segment of the construction 'market'.

In the study use was made of the TRS project and tender details on 2519 government non-residential construction contracts awarded between 1997[6] and 2006. For these contracts 11,525

[6] Although the TRS was initiated in 1996, records in this year were incomplete and, thus, excluded from our investigation.

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tender bids were submitted. This represents close to all the contracts and bids included in the TRS over the 10-year period. Only a very small number of contracts were excluded from the analysis due to incomplete recording of their details.[7]

As outlined in Section 1, the central research question addressed in the quantitative part of this study is whether the additional training requirements imposed as a result of the Priority Access and Building Skills policies had a *measurable and distinct* impact on bid activity for public construction contracts. That is, was there a measurable effect of these policies on bid numbers that was separate from the impacts on bid activity generated by changing economic conditions in the state?

Conducting such an analysis clearly requires a multi-factor approach that is able to 'control' for the influence of the range of other factors on bid numbers (such as changes in private construction activity and costs, as well as variations in contract region and project size) before focusing on the relationship between the implementation of the policies and bid activity.

The approach adopted for this investigation was to examine variations in the number of tender bids for non-residential government construction contracts around the time of the implementation of each policy.[8] In the case of Priority Access policy, the analysis period was August 1997–2001, which encompasses the 24 months prior to and the 24 months after the implementation date of the policy. In the case of the Building Skills policy, the 48-month analysis period was October 2000–2004.

Analysis focused on differences in bid activity between the 'market' segments affected and unaffected by the policy. In the case of the Priority Access Policy this involved a comparison of changes in bid activity across the analysis period between (a) projects with a pre-tender value of at least $150,000[9] (and thus potentially affected by the policy); and (b) projects with a pre-tender value of less than $150,000 (not affected by the policy). In the case of the Building Skills Policy the two comparison groups were (a) projects with a pre-tender value of more than $2million[10]; and (b) projects with a pre-tender value of $2 million or less. In each case we hypothesised that if the policies were affecting bid activity, activity levels would have fallen in relative terms in the market segment affected by the policy. Furthermore, this fall would be observed in the analysis period.

To identify the effect of each policy's introduction on bid activity ordinary least-squares regression techniques were used to estimate the following equation, which relates to the determination of the number of bids for public construction contracts.

$$\mathrm{NB}_i = \beta_1 + \beta_2 \mathrm{PD}_i + \beta_3 Z_i + \beta_4 \mathrm{PT}_i + \beta_5 \mathrm{RN}_i + \beta_6 \mathrm{OF}_i + \gamma_1 (Z_i \times \mathrm{PD}_i) + \varepsilon_i \quad (1)$$

NB_i, is the number of bids submitted on contract i; PD_i is a dummy variable that is based on the date of implementation of the policy (for example, in the case of Priority Access this variable takes on a value of 1 for all contracts dated after August 1999); Z_i is a dummy variable that identifies whether the contract falls within the scope of the policy's application (in the case of Priority Access this variable is coded as '1' for all contracts with a value of $150,000 or more); PT_i is a continuous measure that relates to the contract's pre-tender value; RN_i is a dummy variable that identifies whether the location of the project was in the Perth, South-West or Peel Regions, or in another, more remote region. OF_i is a continuous variable based on the value of the Building Cost index in the month that the bids were recorded. It is used in this model to proxy the level of competition in the construction market.[11] Finally, the interaction term $(Z_i \times \mathrm{PD}_i)$ identifies those projects that were affected by the implementation of the policy (for example, in the case of Priority Access this variable will only take on a value of 1 for contracts with a pre-tender value of $150,000 or more and dated after August 1999). β_1 is a constant; whilst β_{2-6} are measures of the relationship between change in the value of the dependent variables and the number of bids. γ_1 measures the relationship between change in the interaction term and the number of bids. ε_i is a random error term, which is assumed to be normally distributed with $E(\varepsilon_i) = 0$ and the $\mathrm{var}(\varepsilon_i) = \sigma^2$.

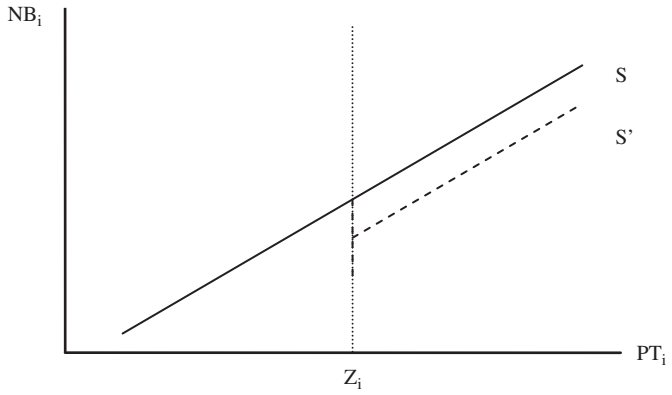

Fig. 1.

The modelled relationship can be described diagrammatically in very simplified terms. The function *S*, shown in the Fig. 1, describes, for simplicity's sake, a positive, linear relationship between the pre-tender value of a public construction contract (PT_i) and the number of bids (NB_i).

The other factors in the model are hypothesised to be associated with shifts in this function. For example, in more remote regions the function *S* could be expected to shift downwards (implying a positive coefficient on the variable RN_i in Eq. (1)) due to the greater difficulties in accomplishing construction work in these areas as compared to less remote regions. Higher building costs (OF_i) are likely to be associated with a downward/rightward shift in the function (implying a negative value on the coefficient β_6). Note that the function *S* will intersect the horizontal axis when the project value is so low that it attracts no bids.

If the introduction of a training policy has a negative effect on bid activity, its application only to projects with a $\mathrm{PT}_i \geqslant Z_i$ would cause a discontinuity in *S* around point Z_i (as represented by the function *S'*). Note that the vertical line in the figure aligns with Z_i and thus it represents the threshold value of contracts affected by the policy. Evidence in support of the hypothesis that the training policy had an effect on bid activity would be a significant negative value on the coefficient γ_1.

[7] The omission of records on location and tender value appeared to be due to record keeping errors and is, thus, unlikely to be a source of systematic bias in the results of our analysis.

[8] This approach to restricting the time period allows us to focus more fully on the effects of the policy whilst allowing for the possibility of anticipatory or delayed effects.

[9] The Priority Skills Policy only applied to projects with a value above $150,000.

[10] The Building Skills Policy only applied to projects with a value above $2 million.

[11] As noted in Section 2, this index reflects current costs of accomplishing the types of construction projects contracted for via the TRS. A variety of measures of market conditions (such as indexes of labour availability, materials costs, etc.) are available. However, testing indicated that these are strongly correlated with the Building Cost Index.

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The other variables in Eq. (1) serve as controls for this analysis. The individual term PD_i controls for the possibility (seemingly remote) that there was a change in bid activity for all contracts around the time of the introduction of the policy. The individual term Z_i controls for the possibility (more likely) that there are underlying differences in the relationship between tender activity and pre-tender prices in the group of contracts 'priced' above and below the trigger value of the policy.

3.2. Results of quantitative analysis

The estimated relationships between tender bid numbers and the various explanatory variables included in the RHS of Eq. (1) using the TRS data are outlined in this section. Reflecting the above discussion, these results are presented separately for the Priority Access and Building Skills policies.

3.2.1. Priority Access Policy

Eq. (1) was first estimated with reference to data on bid numbers on public construction contracts for the period August 1997–2001. In this case Z_i is defined by the introduction of the Priority Access Policy in August 1999 and PD_i is defined by the policy's application to projects with a value of $150,000 or more.

The results of this analysis are presented in Table 1 below.

The data in Table 1 indicate that the implementation of the Priority Access Policy in August 1999 *did not* have a significant effect on competition for government non-residential construction contracts in WA. The reduction in bid numbers observed around the time of the implementation of this policy was similar in 'market segments' subject to the influence of the policy (i.e. contracts with a value of $150,000 or more) and in other parts of the 'market'. The figures in Table 1 show, rather, that during the analysis period (August 1997–2001) bid numbers varied between contracts firstly due to regional factors. The average number of bids on contracts in more remote regions was 1.42 bids less than the number of bids on contracts in the Perth, South-West and Peel group of regions. Bid numbers in the analysis period were also significantly affected by the value of the contract. Contracts with a value of $150,000 or more had, on average, close to 1 additional bid per contract than those with a lower pre-tender value. A somewhat surprising result is the lack of a statistical significant relationship between the Building Cost index and bid numbers. The most likely explanation for this is that the period 1997–2001 was a period of relatively stable economic conditions. There was little variation in the Building Cost index over the analysis period and, thus, this was not an important source of differences in bid activity.

3.2.2. Building Skills Policy

The results derived from the application of Eq. (1) to TRS data relevant to the Building Skills Policy are presented in Table 2. In this case the analysis period spans October 2000–2004; Z_i is defined by the introduction of the Building Skills Policy in October 2002; and PD_i is defined by the policy's application to projects with a value above $2 million. The results of this analysis are presented in Table 2 below.

Table 1
Estimated coefficients for equation on bid numbers on government non-residential construction contracts (Priority Access Policy), Western Australia 1997–2001.

Variable	Coefficient	Prob.
Constant	−4.2950	0.6142
Policy implementation date (PD)	−0.4990	0.3528
Contract above trigger value (Z)	0.9299	0.0007
Pre-tender value (PT)	−1.29E−07	0.0033
Region	1.4243	0.0000
Building cost index	0.0720	0.3394
PD × Z	0.0216	0.9612

Notes: Log-likelihood: 1957.8; nobs: 789; method: OLS.

Table 2
Estimated coefficients for equation on bid numbers on government non-residential construction contracts (Building Skills Policy), Western Australia 2000–2004.

Variable	Coefficient	Prob.
Constant	9.3524	0.0000
Policy implementation date (PD)	−0.4719	0.0516
Contract above trigger value (Z)	1.4512	0.1009
Pre-tender value (PT)	1.39E−07	0.0008
Region	1.2794	0.0000
Building cost index	−0.0436	0.0004
PD × Z	−1.4152	0.0986

Notes: Log-likelihood: 1873.5; nobs: 807; method: OLS.

The data in Table 2 provide some evidence of a negative impact of the Building Skills Policy on bid activity relating to government non-residential construction contracts in WA. Bid numbers on contracts affected by the policy (i.e. above $2 million in value and commencing after October 2002) were, on average, 1.42 bids lower than contracts not affected by the policy after 2002. However, this effect was only statistically significant at the 10% level.

A further contrast between the results in Table 2 and those in Table 1 is the significance of building costs as a source of variation in bid numbers. The figures in Table 2 indicate a strong negative relationship between the Building Cost index and bid numbers. The difference between the results in Tables 1 and 2 is likely to derive from the relatively large rate of change in the Building Cost index between 2000 and 2004, as compared to 1997–2001.

A similarity between the two sets of results is the measured importance of regional factors as a source of variation in bid numbers. In Table 2 the average number of bids on contracts in more remote regions was 1.27 bids less than the number of bids on contracts in the Perth, South-West and Peel region. Finally, bid numbers in the analysis period relevant to the Building Skills Policy were positively affected by the value of the contract.

3.2.3. Differences across market segments

The effects of the Building Skills Policy in the key segments of the WA public construction 'market' can be explored further by adding further terms to Eq. (1). These terms interact the policy implementation date variable with measures of the pre-qualification level of the contractor.[12] The coefficients on these terms identify the different effects of the Building Skills Policy in market segments associated with the pre-qualification status of the contractors, which is closely related to firm size. The amended regression results are outlined in Table 3.

It can be noted, first, that the inclusion of the new terms did not cause the estimated role of other key variables—such as region and building costs—to change in any substantial way. The changed formulation of the model indicates that pre-qualification level is, in the main, an insignificant source of variation in bid numbers. However, the coefficients on the interaction terms are

[12] Pre-qualification level identifies the eligibility of contractors to tender for projects of different values and is closely linked to the size of the company. Pre-qualification for level 3 requires a demonstrated capacity to tender for projects between $1.5 and $3 m; level 4 is limited to companies with a capacity to complete work between $3 and $7.5 m; whilst level 5 is restricted to companies with an assessed capacity to take on work over $7.5 m. Pre-qualification is closely related to tender value. Thus, the tender value variable is removed from the amended regression equation.

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Table 3
Estimated coefficients for equation including market segment measures. Bid numbers on government non-residential construction contracts (Building Skills Policy), Western Australia 2000–2004.

Variable	Coefficient	Prob.
Constant	9.636244	0.0000
Policy implementation date (PD)	−0.426558	0.0810
Contract above trigger value (*Z*)	1.964689	0.2361
Pre-qual.3	1.141072	0.0955
Pre-qual.4	−0.045097	0.9818
Pre-qual.5	−0.677310	0.6921
Region	1.290959	0.0000
Building cost index	−0.045998	0.0002
PD × Z × pre-qual.3	−3.350192	0.0447
PD × pre-qual.4	−0.930167	0.4235
PD × pre-qual.5	0.378037	0.5759

Notes: Log-likelihood: −1871.4; nobs: 807; method: OLS.

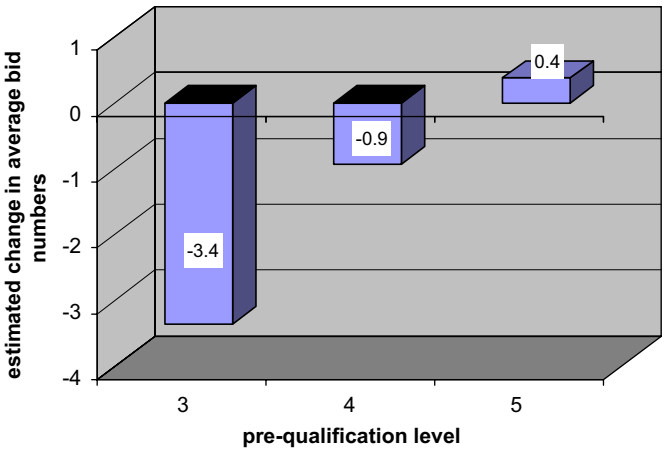

Fig. 2.

the main focus of our interest in this section. They identify whether—and to what extent—the measured effect of the introduction of the Building Skills Policy on bid numbers varied significantly between the different pre-qualification levels. For example, the coefficient on the last interaction term measures the extent to which the difference in bid numbers associated with the policy's introduction varied between the group of projects associated with what is known as a pre-qualification level 5 (restricted to the largest construction firms) and those projects with a pre-qualification level of 2 or less. The results on the interaction terms indicate, first, that the changes in bid numbers on projects associated with pre-qualification levels 4 and 5 following the introduction of the Building Skills Policy were not significantly different from the change recorded by projects unaffected by the policy. This implies that large firms were relatively unaffected by the policy's introduction. In contrast, bid numbers on projects associated with pre-qualification level following the policy's introduction, are shown to be significantly lower than bid numbers on projects unaffected by the policy. This implies that small to medium-sized firms were affected by the policy's introduction, and that they reduced their willingness to tender on government projects as a result. The results are summarised in Fig. 2.

3.3. Discussion of quantitative results

The results of the quantitative analysis are significant for two key reasons. First, they indicate that the Building Skills Policy contributed to a lowering of competition for public construction contracts in the 48-month period surrounding its implementation. As indicated by the theoretical models reviewed in Section 2, such an impact has efficiency consequences for the public construction programme, potentially contributing to higher costs and/or lower quality outcomes. Given that WA is currently under the influence of a range of economic pressures, these added costs are of particular concern.

However, this conclusion does not necessarily imply that the Priority Access Policy was a superior training policy. It is important to ask why the Priority Access Policy *did not* affect the willingness of construction companies to bid for public projects. One possible answer is that it did not impose high training requirements—or affect the training actions of construction firms in a significant manner. If this is the case, the evidence presented in this paper cannot be interpreted as supportive of the policy.

In sum, the results from the quantitative analysis indicate that the Building Skills Policy affected the actions of construction companies, causing some small to medium-sized construction companies to avoid tendering for public construction contracts. These results also suggest, however, that the policy was effective in influencing the inclusion/exclusion of public contractors according to their training commitments. There is little evidence that the Priority Access Policy affected bid activity in the public construction 'market'. Although this may be interpreted in the positive light—that is, of the policy not having negative competitive effects—it is also possible that the policy did not affect training outcomes on public works. The qualitative results, presented in Section 4, cast further light on these outcomes.

4. Qualitative analysis

The qualitative analysis of the training policies of the Western Australian government, presented in this section is based on the costs and benefits as perceived by the main entities affected by these policies. These entities include the contracting agencies, such as the Department of Housing and Works; sponsoring agencies, such as WA's Department of Education and Training; head building contractors; and subcontractors. The section adds important details on the costs and benefits of training policies leveraged on public construction contracts and, as such, it complements the quantitative materials outlined in Section 3.

The sample for the qualitative stage included the key policy officers of the contracting and sponsoring agencies. It also included groups of head and subcontractors. The first group of contractors comprised companies that are currently engaged on public works projects. The second group comprised companies that have ceased tendering for public construction contracts. In the Perth region, one small, medium, and large head contractor was interviewed from each group. In the non-Perth region, small, medium and large head contractors currently engaged in public construction projects were interviewed. The subcontractors interviewed were drawn from both the Perth region and regions other than the Perth region, and also ranged in size from small to large. The interviews were based on a semi-structured format, with a standard set of questions being asked of each entity, but allowing for other relevant issues to be discussed. All the interviews were conducted face-to-face and digitally recorded to ensure the accuracy of the interview transcriptions and summaries. The following paragraphs outline the general nature of the responses to questions relating to the costs and benefits of the different policies that were coded by the project team.

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4.1. Western Australia's priority access policy

Supporting the conclusions reached in the quantitative study, the transcript evidence relating to the Priority Access Policy indicates that it involved only negligible costs but also few benefits. The sponsoring agency, the Department of Education and Training identified only minor costs associated with processing the Priority Access application forms and monitoring the Policy:

> "It was pretty light. Once people got their certificate and were deemed as Priority Access compliant that was it, there was no heavy monitoring. We had one person on it, working on Priority Access, so there weren't a lot of resources put in it from our end." (Key policy officer, DET, WA).

Similarly, the contracting agency, the Department of Housing and Works, incurred few additional administrative costs—primarily associated with including the provisions of the Policy in the Department's tender and contract documentation

> "It's not hard to write things into contracts, it's very easy to write obligations into contracts." (Key policy officer, DHW, WA).

However, the DHW did raise concerns about the impacts of the Priority Access Policy on tender prices, expressing a belief that the Policy had created a disincentive for contractors to bid on government contracts. The contractors that were interviewed during the study did not offer any support for this proposition: claiming that the Policy had no effect on their willingness to bid for government contracts or on the level of their bids (more information on this is contained in coming paragraphs).

The head and subcontractors interviewed associated the Priority Access Policy only with minor time costs. These costs were linked to the tasks of completing and submitting necessary paperwork. The Policy was *not* associated with any additional training costs. The contractors interviewed perceived that they were already compliant with the Policy and that the Policy was *not* the source of their firm's training decision.

This last observation also has relevance to the benefits of the Priority Access Policy. Keeping in mind that the Policy's objective was to:

> "Increase the number of apprenticeship and traineeship opportunities for job seekers." (Priority Access n.d., p.3).

The last comment by the contractors suggests it was not successful. Indeed this was also the assessment of the government agencies associated with its implementation. Key problems apparently related to the low training requirements of the Policy. A DET policy officer commented:

> "It [the Policy's training criteria] became so flexible over the years so that people just needed to show that they were committed to training, they provided work experience, and they employed uni-graduates, that sort of thing. It got a piece of cake to meet. At the end of the day I didn't believe it added any value to the system other than one of perception."

A similar assessment was made by a DHW policy officer, who also highlighted some counter-productive elements of the Policy:

> "When they brought in Priority Access the Priority Access that we ended up with had no particular focus on training either apprentices or professionals or graduates, so providing a contractor could demonstrate training obligations…they became registered…There were comments made across the industry that 'well now we've sacked all of our apprentices because we don't need them."

The contractors who participated in the study were also fully aware of the lax monitoring of compliance with the Policy—and apparently felt no pressure to alter their training decisions as a result of the Policy.

Thus, consistent with the quantitative results, this part of the study concluded that the Priority Access Policy imposed few additional costs on the construction industry, but, and possibly more importantly, it also resulted in few (if any) benefits. There were a number of problems with the Policy, which should be avoided in other attempts to achieve training outcomes from public construction contracts. These included, most notably, poorly specified policy objectives and a lack of resourcing of policy compliance. The ability of firms to nominate a range of expenditures on staff development clearly confused the policy intent and undermined efforts to monitor and enforce the Policy. The Policy is likely to have been more effective if it had nominated a small range of training activities (for example, apprentices, trainees and cadets). This would need to be complemented with an adequate resourcing of efforts to monitor compliance and a willingness to reject non-conforming bids.

4.2. Western Australia's building skills policy

The transcript evidence on the Building Skills Policy also creates a negative impression of the net benefits of the policy intervention. Additional administrative costs were generated by the Policy; however, few tangible benefits can be identified.

The sponsoring agency, the Department of Education and Training identified additional costs that were associated with the development and evaluation of what was, apparently, a 'complex policy'. The DHW incurred some minor additional costs due to the need to incorporate the Policy's provisions into standard construction contracts. However, as before, its primary concern was with the negative impacts of the Policy on contractors' willingness to bid on government contracts.

The contractors interviewed typically did not associate the Policy with more than 'nuisance level' costs. Importantly, in the main, they did not link the Policy to their decisions about bidding on government projects. Only one of the participants in the study claimed he had been dissuaded from competing for government jobs because of the training provisions.

The industry participants also typically did *not* link their training decisions to the requirements of the Building Skills Policy. As was the case for the Priority Access Policy, these comments also have importance for assessments of the benefits of the Policy—especially as its stated objective was to:

> "ensure an adequate supply of skilled labour for current and future needs" (Building Skills n.d.:3).

One contractor commented that the Building Skills Policy:

> "…wouldn't encourage me to employ apprentices. We employ apprentices because we employ apprentices. I'm not going to employ an apprentice just because I want to get a government job."

The policy officers interviewed were also sceptical about the positive effects of the Building Skills Policy. A telling comment was made by a policy officer from the DET, based on his department's own previous evaluation of the Policy:

> "The evaluation of the Building Skills Policy was not very positive, it was found not to have added any new apprentices, we could only find one, we could only identify one."

The critical reasons for this Policy's lack of success also appear to relate to measurement and monitoring problems. First, once

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again, contractors appear to have found the Policy's provisions easy to avoid (limiting compliance incentives). One contractor provided the following example:

> "You get a hospital say, and you've got a component for the mechanical contractor, whose got to provide so many training hours, and he's got a DHW contract with us, and he's got 15 others with a resource company, and he's got two apprentices, he shoots those two apprentices over here, and meets all his requirements. He hasn't actually gone forward. You know, so that's where the whole system flounders."

The sponsoring agency also apparently encountered difficulties in measuring actual training outcomes:

> "The Policy required that we could only count people working on the site, we could only count people or trades that were actually working on the sites, so you had your cabinetmakers and refrigeration people that didn't count, even though they were doing work for that building."

In summary, the information collected in the interviews with participants in the industry indicates that there were few benefits generated by the Building Skills Policy. The Policy was not perceived by the interviewees as a significant influence on their training decisions. Other factors—such as confidence in future projects—were much stronger influences on these decisions. However, the Policy was associated with administrative costs for both the government agencies and, to a lesser extent, the contractors. There is some evidence in the interview transcripts that these deterred some contractors from bidding for government contracts. To the extent that this evidence is representative of the response of a number of contractors across the State, the Policy can be seen to have reduced the pool of competitors for government contracts. This constitutes another important cost of the Policy. The contractors who remained interested in tendering for government contracts appear likely to be those who were already committed to training and/or were able to spread the administrative and training costs across a range of projects. Those who dropped out were either less committed to training or less able to meet the administrative and/or training costs. The incidence of training on government projects may have increased due to these 'selection effects' of the Building Skills Policy. There is no evidence in our transcript evidence that the Policy altered the level of training investment in the State.

5. Conclusions

The evidence compiled on the leveraging of training outcomes on public construction projects in this paper raises substantial concerns about the net social benefits of the current training policy interventions of the WA government. The interventions appear to involve a 'light' approach to the imposition of training obligations on contractors. As such, they have the advantage of keeping administrative and additional contracting costs to a minimum. However, the positive impacts of the policy interventions on training outcomes also appear to have been very small, at least in the short- to medium term.

Generally, this paper has highlighted that in the absence of strong industry commitment to policy objectives, policy interventions are likely to result in high levels of avoidance activity and generate very few benefits. Thus, for policy action on, for example, training to be successful, compliance issues must be adequately addressed.

Currently it appears that pre-qualification schemes (similar to the Priority Access Scheme) and schemes that rely on measuring the training investments of contractors within particular projects do not achieve high levels of compliance and involve significant costs for the administering authority. Alternatives need to be developed to these policies and a recommendation is thus made that policy alternatives be fully researched and evaluated. The rising trend towards the contracting out of public-sector construction work, together with concerns about the availability of skilled labour makes this type of research of great policy relevance.

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References

Alchian, A., Demsetz, H., 1972. Production, information costs, and economic organization. American Economic Review 62 (5), 777–795.
Becker, G., 1975. Human Capital, second ed. National Bureau of Economic Research, New York.
Bennett, J., Iossa, E., 2005. Building and managing facilities for public service. Working Paper Series no. 05/137, Centre for Market and Public Organisation, University of Bristol.
Blom-Hansen, J., 2003. Is private delivery of public services really cheaper? Evidence from public road maintenance in Denmark. Public Choice 115, 419–438.
Carver, R., 1989. Examining the premises of contracting out. Public Productivity & Management Review 13 (2), 27–40.
Domberger, S., Jensen, P., 1997. Contracting out by the public sector: theory, evidence, prospects. Oxford Review of Economic Policy 13 (4), 67–78.
Edwards, F., Stevens, B., 1978. The provision of municipal sanitation services by private firms: an empirical analysis of the efficiency of alternative market structures and regulatory arrangements. The Journal of Industrial Economics 27 (2), 133–147.
Ehrenburg, R., Smith, R., 2005. Modern Labour Economics: Theory and Public Policy, ninth ed. Pearson Education, Boston.
Globerman, S., Vining, A., 1996. A framework for evaluating the government contracting-out decision with an application to information technology. Public Administration Review 56 (6), 557–586.
Hart, O., Shleifer, A., Vishny, R., 1997. The proper scope of government: theory and an application to prisons. The Quarterly Journal of Economics, 1127–1161.
Holcombe, R., 1991. Privatization of municipal wastewater treatment. Public Budgeting & Finance, Fall 11, 28–42.
Holmstrom, B., Milgrom, P., 1991. Multitask principal-agent analyses: incentive contracts, asset ownership and job design. Journal of Law and Economics 7, 24–52.
Jensen, P., Stonecash, R., 2004. The efficiency of public sector outsourcing contracts: a literature review. Melbourne Institute Working Paper no. 29/04, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.
Prendergast, C., 1999. The provision of incentives in firms. Journal of Economic Literature 37 (March), 7–63.
Reca, J., Zieg, K., 1995. Privatization—an analysis of contracting out of government-provided services. National Contract Management Journal 26 (2), 51–64.
Rimmer, S., 1994. Competitive tendering and contracting: theory and research. The Australian Economic Review (3), 79–85.
Sappington, D., 1991. Incentives in principal-agent relationships. Journal of Economic Perspectives 5 (2 (Spring)), 45–66.