

10

Market Failures and Government Remedies

Throughout Part A, we emphasised that the market system allocates resources efficiently. We described how the price mechanism provides an incentive for firms to enter and exit markets in their search for profits, and how each market arrives at equilibrium. Indeed, up until the last chapter, the dominant theme has been that most economic problems can be resolved by allowing the free market to work (see, for example, Key Points 2.1, 3.1, 5.4, 6.1, 7.1, 8.1 and 8.2).

The market, however, does not always work. There are some circumstances which prevent the price system from achieving productive and allocative efficiency. This seems to be particularly the case for markets involving or impacting on the environment; markets in which goods are not privately managed but commonly owned. In these cases, non-market alternatives need to be considered. One of the most important non-market forces is government, and this chapter reviews the government's role within failing markets. We shall, however, also recognise the possibility that governments can also fail to achieve efficient outcomes, and this is discussed at the end of the chapter.

Market failure may be defined as any situation where the unrestricted price system causes too few or too many resources to be allocated to a specific economic activity.

There are many examples of market failure. As we suggested in Chapter 2, the majority of environmental problems such as polluted seas, devastated forests, extinct species, acid rain and the vapourising ozone layer are associated with market failure.

WHAT CAUSES MARKET FAILURE?

There are several causes of market failure but, as we are concerned here with effective protection of the environment, we shall deal with those that relate to environmental resources. This means that we shall only concern ourselves with three major reasons for why markets fail. These are:

- externalities
- free-rider problems
- asymmetric information.

Externalities

We introduced the conceptual parameters necessary to understand externalities in Chapter 2 (see Key Points 2.4). We contrasted **private costs** and **external costs** – a distinction that helps to explain a broad set of environmental problems. The related analysis represents an important tradition in welfare economics, stretching back to the beginning of the twentieth century.

The idea that economic efficiency should describe a situation in which nobody can be made better off without making somebody else worse off dates back to around 1890 in work by Vilfredo Pareto, an Italian social scientist. According to Pareto, in a truly efficient competitive market all the exchanges that members of the economy are willing to make have to be agreed at fair prices. In such a situation, nobody can benefit unless they take advantage of someone else. There is a general equilibrium. All members of the economy face the true opportunity costs of all their market-driven actions.

In many real markets, however, the price that someone pays for a resource, good or service is frequently higher or lower than the opportunity cost that society as a whole pays for that resource, good or service. In short, it is possible that decisions made by firms and/or consumers in a transaction will affect others not involved in that particular transaction to their benefit or detriment. To put it more simply, in the competitive marketplace, a deal is struck between a buyer and seller to exchange a good or service at an agreed price; but, alongside this two-party activity, there are possible spillovers to third parties – that is, people external to the specific market activity. The spillover benefits and costs to third parties are termed **externalities**.

An example of an externality is the pollution of a river, the air or an open public space caused by a construction process. This leads to a general loss of welfare for a community. If this community is not compensated for its loss, then the cost is external to the production process. The construction firm has created a negative externality. In producing a building, the firm has paid for inputs such as land, labour, capital and entrepreneurship, and the price it charges for the finished product reflects all these costs. However, the construction firm has acquired one input – waste disposal into the river, air or open space – for free, by simply taking it. This is, indeed, taking a liberty; the construction firm is not paying for all the resources it is using. Or, looking at this another way, the construction firm is giving away a portion of environmental degradation free with every product.

Any kind of spillover that causes environmental pollution is called a *negative externality* because there are neighbourhood costs such as contaminated water and loss of habitat and associated health issues such as respiratory problems that society at large has to pay. In other words, these community costs are external to the economic transaction between the construction firm and the purchasers of the completed building. An important goal of environmental economists is to close the gap between private costs and external costs. The aim is to make the polluter pay – to make sure that those responsible for causing the pollution are made to pay the costs. This idea of making the polluter pay is discussed later in the chapter (see *Correcting Market Failure*, page 150). Note, however, that if these costs are to be invoiced in some way we need to know how much to charge which, in effect, means putting a monetary value on the environment – and we shall look at ways of measuring environmental costs in more detail in Chapter 11.

Before leaving the topic here, however, we should acknowledge that not all externalities are negative. The production of a good or service can generate spillover benefits for third parties. In these instances, the market failure is not so problematic. Governments can choose to finance these goods or services that generate positive

externalities through subsidies to the private sector – ensuring that companies are rewarded for production of a good or service that, if left to market forces, would be underproduced. A simpler alternative is for a government to take responsibility for the production of the good or service itself. The next section on free riders will confirm the appeal of this approach.

Free-rider Problems

Whenever positive externalities greatly exceed private benefits, the good or service concerned becomes unprofitable in the market context – in effect, some benefits associated with the good or service are allocated for free. For example, if you pay for several lampposts to light the pathway and pavement outside your house, the private benefit (to yourself) would be too small relative to the cost. And the external benefit to your neighbours from this street lighting would be significant, as they would be getting a brighter pathway for free. The problem is that the market system cannot easily supply goods or services that are jointly consumed. For the market to work efficiently a two-party agreement is preferable. If non-paying parties cannot easily be excluded from the benefits of a good or service, we have the problem of the **free rider**. Good examples of this situation are the markets for sewerage services, public open space, paving, street lighting, flood control, drainage, roads, tunnels, bridges and fire-protection services.

Asymmetric Information

Most economic texts identify the problems created by a dominant firm, or a group of colluding firms, as typical causes of market failure. As an example, reflect on the market structures that typify firms in construction and the possible opportunities for them to enter into agreements on joint profits (or at least review Key Points 8.4). In this text we have chosen to emphasise that *any* contractual agreement that is loaded in favour of one party can contribute to market failure. There is a general problem of one-sided information. In Chapter 6 (see page 80), we introduced the idea of asymmetric information.

A situation in which some of the parties involved in an economic transaction have more information than others is defined as asymmetrical.

Markets may not achieve efficient outcomes when the consumer has to defer to a more informed producer. Let us develop this idea a little further with a simple example. When most consumers go into a music shop to buy a CD, they have enough information to make a rational decision. When they purchase services from a builder, the situation is often very different. In this situation, purchasers know roughly what they want to achieve – but they must rely on the experience and advice of the builder to specify what precisely needs to be done.

This situation – in which one party holds most of the cards – is a common cause of market failure. A new academic approach to market analysis is emerging that focuses on the contractual agreement between the ‘principal’ – that is, the client – and the ‘agent’ – the contractor. This focus on the **principal-agent** relationship questions the balance of power between the less informed client and the

knowledgeable agent. The debate is around the extent to which the agent acts in the best interests of the client. This analysis of the principal-agent relationship demonstrates how the skills and experience of the agent could lead to a situation in which a trusting client may be misinformed. The initial discussions on principal-agent relationships appeared in health economics: in health contexts, it is clear that the doctor – the agent – has far more medical information than the patient – the principal. Consequently, we are very reliant on doctors to act in our best interests.

Principal-agent analysis can equally be applied in construction contexts – to project managers, engineers and architects. Many large-scale construction projects are technically complex and not easily understood by non-professionals. Although the costs of a mistaken choice may not appear as dire as in medical cases, they are equally difficult to reverse. For example, if the clients or purchasers of a major building development wish to reduce the environmental impact of the construction process, they are completely dependent on the expertise of contractors to achieve these outcomes. It is quite possible that energy usage may not as efficient as it could be or that waste may not be minimised as requested. The hired 'agent' may not always act in the client's best interest, and they might be able to get away with it because of the 'principal's' incomplete knowledge.

Key Points 10.1

- ☆ Market failure occurs whenever the free forces of supply and demand over-allocate or under-allocate resources to a specific economic activity. Examples seem to be widespread across the environment.
- ☆ Three reasons for market failure are (a) externalities, (b) the free-rider problem and (c) asymmetric information.

CORRECTING MARKET FAILURE

Governments can intervene in various ways to correct market failings. Some available policy measures are outlined in Table 10.1. This indicates, in a very general way, some of the current approaches that are used to tackle different types of market failure. We shall discuss at least one group of policy measures for each particular cause of market failure before going on to considering their effectiveness.

Internalising Negative Externalities

We have noted that widespread environmental damage often results from negative externalities. Governments have found that one instrument on its own is rarely sufficient to tackle these problems. As you can see from Table 10.1, the government uses a range of measures and **market-based instruments**. Taxes are regarded as one possible way to internalise external costs into the price of a product or activity. Interestingly, the most recent examples of new taxes introduced to reduce negative externalities all relate to the construction industry.

Table 10.1 Government policies to address market failures

Market failure	Tax	Tax credits/ public spending	Publicity campaigns	Regulations
Negative externalities	Aggregates levy	Reduced rate of VAT on grant-funded installation of heating		Water quality legislation
	Climate change levy			
	Landfill tax			
Free-rider problems		Provision of public goods		Habitats and species legislation
		Tax relief for cleaning up contaminated land		
Asymmetric information	Differential rates of fuel duty		Energy efficiency campaigns	Building regulations
			EU eco-label scheme	

Source: Adapted from HM Treasury (2002: 23)

LANDFILL TAX

The landfill tax was introduced in October 1996. It was imposed to provide an incentive to minimise waste and promote recycling – to internalise the costs to the community of waste going to landfill. Depending on the nature of the waste, the tax can be as much as £14 or £15 per tonne. This is potentially a significant penalty: in 1998, a typical year, 70 million tonnes of construction and demolition waste ended up as landfill waste – of which nearly 20 per cent apparently represented materials delivered and thrown away unused (DETR 2000: 10). The government has indicated that it expects to make annual increases in the standard rate of landfill tax, and within the next decade it could exceed £35 per tonne. These rates send a clear signal about the need to reduce the external costs associated with the large volume of waste sent to landfill, and help to provide an economic incentive to develop alternative forms of waste disposal.

When the tax was first introduced the government acknowledged the difficulty of identifying a fair rate for the tax, and it was offset by a 0.2 per cent cut in employers' national insurance contributions. This compensatory gesture was the first step of a government commitment to shift the tax burden away from 'goods' such as employment towards 'bads' such as pollution.

CLIMATE CHANGE LEVY

The climate change levy commenced in April 2001. It is basically a tax on the business use of energy, and it covers the use of electricity, gas, coal and liquefied

petroleum gas (LPG) used by the non-domestic sector. The levy is imposed on each business energy bill according to the amount of kilowatts used. There are differential rates for different energy sources. The levy is nearly three times higher for electricity (0.43p/kW) than gas or coal (0.15p/kW). This differential has been introduced because the use of each type of fuel creates different levels of greenhouse gas emissions – which cause climate change.

The purpose of the climate change levy is to encourage businesses to internalise – that is, pay for – the negative externalities associated with the greenhouse gas emissions that they are responsible for generating. Firms using environmentally friendly energy technologies, such as photovoltaic systems, energy crops and wind energy, or combined heat and power systems are exempt from the levy. Manufacturing, mining and utilities have been hit the hardest by the introduction of this levy. Ironically, the impact on the construction industry could be beneficial: the climate change levy encourages businesses to use energy more efficiently, and as all businesses occupy buildings, the expertise of the construction industry could potentially help to make their offices and factories more energy efficient and save them from increased energy costs.

AGGREGATES LEVY

The aggregates levy came into effect in April 2002. It is a tax applied to the commercial exploitation of rock, sand and gravel. It applies to imports of aggregate as well as to aggregate extracted in the UK. Exports of aggregate are not subject to the levy. The purpose of the levy is to give businesses operating in the UK an incentive to compare the full costs – including all negative externalities – of using alternatives or recycled materials with virgin equivalents.

To explain it another way, the levy has been established to reduce the noise and scarring of the landscape associated with quarrying. These environmental costs could not continue to be ignored, and the levy is meant to encourage the polluter to pay. The intention is that the construction industry should reduce its demand for primary materials, recycle as much as possible and reduce waste on site. The immediate benefactors from the removal of these negative externalities would be those communities living close to the quarries. And it is interesting to note that their opinions were sought in the preparatory research that established the aggregate levy at a rate of £1.60 per tonne. Finding an exact value for the environmental costs of quarrying will be examined further in the next chapter.

Provision of Public Goods

The second area that we have identified as a cause of market failure relates to the free-rider problem. The basic problem here is excludability. The benefits of some goods or services – due to their very nature – cannot be excluded from non-payers. Even supporters of the free market, from Adam Smith to Milton Friedman, have recognised that there are a few goods and services that the market mechanism does not supply effectively. These are generally referred to as **public goods**.

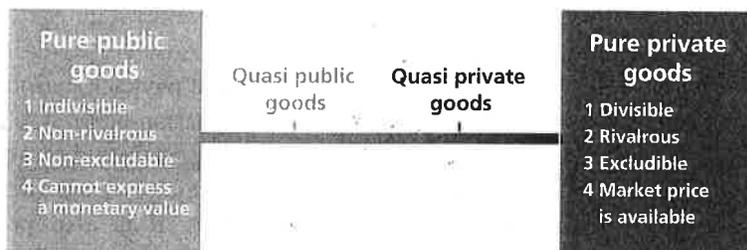
In order to explain the precise nature of public goods, it is helpful to begin at the other end of the spectrum and clarify the definition of **private goods**. Indeed, so far

in this text, private goods have been at the heart of the analysis. We have mainly discussed the activity of private construction contractors – providing private goods and services. These private goods (and services) are distinguished by two basic principles. One can be termed the **principle of rivalry**. This means that if you use a private good, I cannot use it; and, conversely, if I use a private good, you cannot use it. For example, when I use the services of a plumber, he or she cannot be working at the same time on your water and heating system. We compete for the plumber's services; we are rivals for this resource. The services of plumbers are therefore priced according to our levels of demand and the available supply of their time; the price system enables plumbers to divide their attention between customers. The other principle that characterises a private good is the **principle of exclusion**. This simply implies that once a good is provided others may be prevented from enjoying equivalent benefits unless they pay. In short, anyone who does not pay for the good or service is excluded. For example, if a road bridge is set up with a tollgate, then the communications link that the particular bridge offers is available only to those who pay. All others are excluded by the price mechanism.

These principles of exclusion or rivalry cannot be applied to *pure* public goods. They are non-excludable and non-rivalrous in their characteristics. National defence, street lighting and overseas representation are standard textbook examples of pure public goods. A distinction is sometimes made between *pure* public goods, which are both non-excludable and non-rivalrous, and *quasi* (near or impure) public goods, which do not have both these characteristics. The major feature of *quasi* public goods is that they are jointly consumed. This means that when one person consumes a good, it does not reduce the amount available for others. It is difficult, therefore, to apply a discriminatory price system. Construction projects, such as bridges and roads, exemplify quasi public goods – especially if a toll system is enforced.

There are four distinguishing characteristics of public goods that set them apart from normal private goods. These four qualities are portrayed in Figure 10.1. This shows a spectrum contrasting the characteristics of pure public goods against those that typify pure private goods.

Figure 10.1 A spectrum of economic goods



Developing Figure 10.1, we can describe public goods in more detail as follows.

- Pure public goods are usually indivisible, as these goods cannot be produced or sold in small units.
- Public goods can be used by increasing numbers of people at no additional cost – both the opportunity cost and marginal cost of one more user is normally zero.
- Additional users of public goods do not deprive others of the benefit.
- It is very difficult to charge people for a public good on the basis of how much they use, and they cannot be bought and sold in the marketplace.

TAX RELIEF

Public goods overcome the failure of markets to supply goods or services that generate external benefits. In other words, they enable governments to intervene to provide resources that market forces would otherwise under-allocate. Equally, the government could provide tax incentives or subsidies to encourage the private sector to innovate in a way that will benefit society as a whole, both now and, more importantly, in the future. There are various tax incentives and subsidies to encourage research and development across all sectors. For example, developers are being encouraged to devise ways to clean up contaminated land through the provision of a 150 per cent tax credit for the costs incurred.

Publicity Campaigns and Regulation

In each of the remedial actions described so far, businesses are being encouraged to reduce the incidence of environmental damage, either by responding to modified price signals that include environmental costs or through the government taking responsibility by providing public goods or paying tax incentives. In contrast, another set of options is for governments to set regulatory standards or use their authority to provide information to aid decision-making. As these schemes are relatively less likely to raise business costs, they are considered rather ineffective instruments. But in some instances there are few alternative options, and these mechanisms continue to have a role to play – particularly as they dominate conventional past practice.

PUBLICITY CAMPAIGNS

If there are information barriers to better environmental performance, governments can run information and publicity campaigns. For example, energy efficiency campaigns aimed at householders and businesses may raise construction clients' understanding of what to expect in terms of standards and payback periods, etc. The EU energy-labelling scheme is another example of information helping to encourage environmentally friendly purchasing. Ideally these campaigns should create a greater symmetry between the expectations of consumers and the knowledge of suppliers – leading to a fairer, more efficient market allocation. It is also possible for information measures to reinforce the objectives of new taxes. For example, information on greenhouse gases can help people to respond positively to carbon taxes that differentiate between fuel sources. In this way, information can raise awareness and provide a greater measure of consumer protection.

BUILDING REGULATIONS

To prevent agents (that is, producers) from denying responsibility for their products over their life cycles, governments have created base line standards. These seem to be particularly important where habitat needs to be protected, where water quality needs to be maintained or building standards observed. Most legislation of this type is well established – for instance, the present set of **building regulations** is more than twenty years old.

According to the Building Act of 1984, building regulations can be made in England and Wales for the purposes of securing the health, safety, welfare and convenience of people in and around buildings, to further the conservation of fuel and power, and to prevent waste, etc. Responsibility for complying with the regulations rests with builders and developers. The aim is to assure the public that a certain level of technical accuracy has been achieved and environmental impacts reduced.

Key Points 10.2

- ☆ Governments can use several devices to correct market failure. These include taxes to internalise externalities, the provision of public goods to overcome free-rider problems, and publicity and legislation to reduce the problems associated with imperfect flows of information.

ARE GOVERNMENT CORRECTIONS EFFECTIVE?

The assumption that the alternative to a failing market is a brilliant government is wrong. Governments can fail, too. Several of the corrective measures we have discussed have problems, which are briefly summarised in Table 10.2 and are examined further in this section.

Table 10.2 Market failure and government remedies

Cause	Correction	Problems
Externalities	Taxes and levies	Measurement problems
Free-rider problem	Public goods Tax credits	Tax burden
Asymmetric information	Publicity campaigns Building regulations	Enforcement problems

Measurement Problems

Government attempts to minimise negative externalities require measurement. The **polluter pays principle** is all well and good, providing that the guilty party is easy to

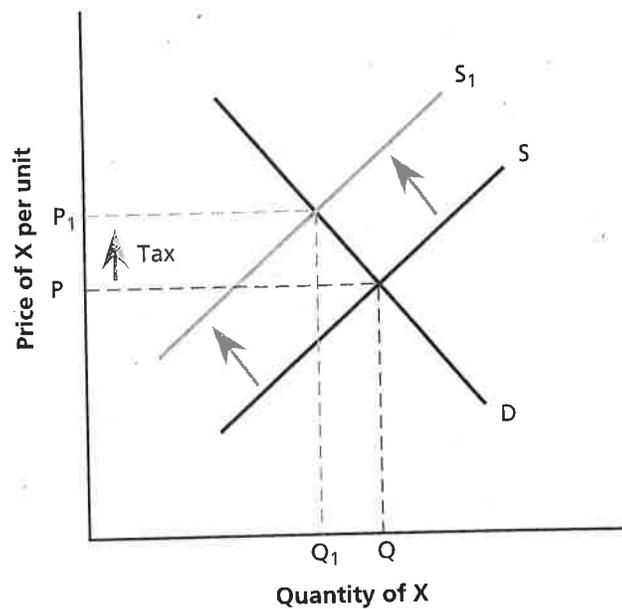
identify and that it is possible to determine a fair price for them to pay. Given that many externalities manifest themselves in global or national environmental issues and involve free goods, such as air, the ozone layer, habitat, flora, waterways, peace and quiet, their measurement (and assessment) causes endless problems.

To analyse these problems further it may help to consider Figure 10.2. Here we have the demand curve D and the supply curve S for product X . The supply curve includes only the private costs (internal to the firm). Left to its own devices, the free market will find its own equilibrium at price P and quantity Q . We shall assume, however, that the production of good X involves externalities that are not accounted for by the private business. These externalities could be air pollution, destruction of a green belt, noise pollution or any neighbourhood cost. We know, therefore, that the social costs of producing X exceed the private cost. This can be illustrated by shifting the supply curve to the left, since it indicates that theoretically the costs of producing each unit are higher. (You may remember from Chapter 5 that changes in price and non-price determinants – such as a tax – are represented in different ways in graphical analysis. Review Key Points 5.3 for further clarification.)

The diagram highlights the fact that the costs of production are being paid by two groups. At the lower price P , the firm is only paying for the necessary private

Figure 10.2 Internalising external costs

We show the demand and supply for X in the normal way. The supply curve S represents the summation of the private costs, internal to the firm producing X . The curve to the left, S_1 , represents the total (social) costs of production. The grey arrows indicate the external costs that have been added. In the uncorrected situation, the equilibrium is Q, P . After imposing a tax ($P_1 - P$), the corrected equilibrium would be Q_1, P_1 .



inputs. The difference between the lower price P and the higher price P_1 is the amount paid by the community – the external costs. For these external costs to be internalised, the government would need to introduce a tax equal to $P_1 - P$. This should result in fewer resources being allocated to this activity – with less demand and supply Q_1 – as the tax would lead to higher prices and force potential purchasers to take into consideration the costs imposed on others.

It is easy to see, therefore, that in an unfettered market, external costs are not paid for and resources are over-allocated to environmentally damaging production. A tax should help to alleviate the problem, but the practical issues of precisely how much tax and who will be burdened with the expense are difficult questions to resolve.

Tax Burden

As we have explained, pure public goods would not be properly provided by a market structure because of the free-rider problem. For similar reasons, quasi public goods would also be under-allocated. The incentive to contribute to the cost of production of public goods is greatly reduced by the knowledge each individual will potentially benefit regardless of whether they pay. Consequently, most governments step in to provide goods and services such as law and order, overseas representation, infrastructure and environmental management. The concomitant demand for roads, tunnels, bridges, prisons, police and fire stations, overseas embassies, play areas, clean recreational space, flood control systems, etc. explains how governments become such important clients of the construction industry. In the UK, the public sector accounts, in value terms, for nearly 40 per cent of the business done by construction firms; worth some £25 billion annually (DETR 2000: 13).

The drawback to this level of commitment is the cost, especially as the majority of goods that governments produce are provided to the ultimate consumers without direct money charge. Obviously, this does not mean that the cost to society of those goods is zero. It only means that the price 'charged' is zero. The full opportunity cost to society is the value of the resources used in the production of goods provided by the government. For example, though nobody pays directly for each unit of consumption of defence or environmental protection, everybody pays indirectly through the taxes that finances government expenditure.

In the UK, the government collects something approaching £400 billion in taxes each year. Spending on law and order, defence, the environment, international co-operation and transport alone accounts for approximately 25 per cent of this expenditure. In effect, the average citizen in the UK must work from 1 January to March or April just to pay all their taxes.

This **tax burden** is clearly a significant proportion of any citizen's income, and it raises some of the thorniest questions that any government has to face. In the UK, and much of the developed world, public spending grew relatively unchecked until the early 1970s, but now many governments choose to exercise some restraint by following the **golden rule** – which, in simple terms, means that governments should not allow current spending to exceed current receipts. The golden rule forms a central plank of modern government and its function will be discussed further in Chapter 12.

Enforcement Problems

The success of any policy cannot rely solely on a strong theoretical argument. Political support, voter appeal and luck are equally important. In other words, just because a government has carefully debated and passed through parliament a new policy, launched a publicity campaign, or initiated another set of regulations does not automatically guarantee success.

Rule-based measures, such as regulations, create a whole range of associated costs. There are the compliance costs of implementing, enforcing and administering the legislation. For example, establishing any set of building regulations entails a significant research cost and then it requires employing building control officers across each local authority to make sure that the regulations have been carried out. The Environment Agency experiences a similar set of problems, and it frequently argues that it has insufficient funds to carry out the number of inspections that the directives emanating from Westminster and Brussels require. In 2002 the Environment Agency complained of a funding gap of £12 million. One of its worries was that the impact of EU directives to phase out landfill sites was leading to an increased amount of fly-tipping.

Even if regulations are enforced, there is little incentive to be innovative. In fact, some analysts argue that the heavily regulated nature of construction activity creates many of the conservative attitudes that typify the industry. As there is usually no incentive to do better than the regulatory standard that has been set, construction firms only do the minimum that is required. Similarly, if governments rely on publicity campaigns that do not raise the costs of production, then all businesses, construction or otherwise, have no real incentive to refrain from using polluting products and methods.

Businesses can improve performance. Some exceptional examples of potentially resource efficient projects were given in Chapter 9 (see, for example, Table 9.4). Indeed, it was suggested that in some instances it was possible to exceed traditional performance by factors of 4 and even 10. But, in general terms, the construction industry suffers from inertia, and is not particularly innovative or sustainable.

Key Points 10.3

- ☆ One method for internalising external costs is to impose a tax. But it is difficult to set tax rates so that the polluter pays the correct amount.
- ☆ To overcome resource allocation problems, governments usually provide a range of public goods. Inevitably, these create a range of associated costs that are ultimately financed by taxpayers.
- ☆ Just because a government has rubber stamped some regulatory procedures or launched a publicity campaign, does not automatically mean that better practices will be effectively enforced or voluntarily introduced.

GOVERNMENT FAILURE

To conclude this chapter, we should recognise that market failure cannot simply be remedied by government action – that is, perfect governments do not resolve imperfect markets. In fact, modern economic texts also acknowledge the occurrence of **government failure**.

Government failure is understandable, since the political process by its very nature is likely to be inefficient in allocating resources. When choices are expressed through the market mechanism, the price forces individual to absorb most of the costs and benefits. Politicians, however, allocate resources more on the basis of judgement. Government judgements are often skewed by lack of financial incentives, gaps in information and pressures applied by different interest groups that need to be acknowledged for re-election.

The sheer scale of managing a nation from the centre is problematic. As we have discussed above, there are problems of enforcement, funding and measurement. These problems lead to inefficiency and a wasteful use of resources. Indeed, the more wide reaching and detailed an intervention becomes, the less likely it is that the benefits will justify the costs.

In recent years, therefore, the tendency has been to believe that, in general, markets provide the best means of allocating resources; and this is as true for environmental resources as for others (HM Treasury 2002: 1). Government systems tend to become bureaucratic, inflexible and excessively expensive to run. Furthermore as government intervention increases, individual liberty is reduced and the profit motive declines. The present trend, therefore, is to provide incentives through the market system. This means that environmental taxes and other economic instruments will continue to be the key tools used to achieve environmental improvements. How far this trend should continue before we reach an 'optimum' level of government intervention is debatable – it is not solely a question of economic efficiency; but one of politics too.

Key Points 10.4

- ☆ Government failure is a recently acknowledged phenomenon that highlights the fact that constitutional intervention through policy initiatives does not necessarily improve economic efficiency.
- ☆ Government failure is caused by a number of factors, such as poor judgement, lack of information, inadequate incentives and the sheer scale of the problems to be resolved.

12

Managing the Macroeconomy

Most modern governments strive to deliver economic stability. This is deemed a prerequisite for achieving high levels of growth that meets the needs of everyone. For example, when Gordon Brown became Chancellor of the Exchequer in 1997, one of his first statements was a confirmation of the Labour government's commitment to securing high and stable levels of growth and employment. In this chapter, we shall review the policies and objectives that underpin this vision of economic growth that meets the needs of everyone. We shall also consider economic forecasting. All this has direct importance for anyone who needs to understand, manage and/or plan construction capacity over a medium-to-long time period, as the demand for construction products is always derived from activity in other sectors. Inevitably, then, construction economists and planners need to interpret economic statistics relating to the wider economy and this forms a further part of this chapter.

FIVE MACROECONOMIC OBJECTIVES

All governments, regardless of their political persuasion, seek to achieve common economic goals. In economics, these goals are referred to as **macroeconomic objectives**. There seems to be some political and economic consensus about the five dominant macroeconomics objectives: price stability, full employment, a sustained rate of economic growth, a positive trade balance with overseas partners and effective protection of the environment. Each of these objectives is considered in turn below. Recent macroeconomic statistics for the UK economy, which show the extent to which these objectives are being achieved, are presented in Table 12.1 (see page 183).

Stable Prices

Stable prices are crucial for business confidence, facilitating contracts and enabling the exchange rate system to function smoothly; in contrast, persistently rising prices cause problems for most sectors of an economy. Consequently, price stability has become the primary objective of most governments that wish to secure long-term growth and full employment. It is no longer believed that tolerating higher rates of inflation can lead to higher employment or output over the long term. Today's target is to keep inflation within a range of 1.5–3.5 per cent and the **retail price index (RPI)** is monitored on a monthly basis. A sample of annual RPI statistics for the UK economy covering the period 1990–2001 is presented in Table 12.1. As the table shows, the recent trend is for declining inflation, and this is regarded as encouraging, not as an end in itself, but due to its economic significance in meeting all other government objectives. Price stability is so central to understanding modern macroeconomic management that we present a full explanation of its measurement and its impacts upon business expectations in Chapter 14.

Full Employment

A large pool of unemployed labour represents wasted resources. Unemployment has many costs, not just in terms of loss of output but also in terms of human suffering and loss of dignity. All governments record the number of workers without a job, although the precise way this is measured changes from time to time. At present 'official' unemployment in the United Kingdom is estimated by the number of people registering for unemployment benefit – known as **claimant unemployment**. Unemployment is either expressed as a percentage rate – the number of claimants as a percentage of the total workforce of 28 million – or as an absolute number. As Table 12.1 shows, the unemployment rate has been below 10 per cent for over a decade, with unemployment reaching a high of approximately 2.3 million in the mid 1990s. The figures in Table 12.1 also suggest that lower levels of unemployment are associated with declining rates of inflation.

Sustained Economic Growth

A long-term objective of all governments is to achieve steady increases in productive capacity. Governments measure **economic growth** by the annual change in the rate of output, and the commonly used measure of economic output is GDP – **gross (total) domestic (home) product (output)**. GDP figures are used worldwide as a proxy for a country's progress towards prosperity: since the more money a country makes, the higher its GDP growth, the assumption is that increases in GDP mean that the citizens of that country are enjoying a higher standard of living. The way GDP measures output can be seen as a giant till ringing up all the transactions taking place inside a country. To accurately portray the rate of change of actual output, GDP must be corrected for price changes from one time period to another. When this is done, we get what is called 'real' GDP. So a more formal measure of economic growth can be defined as the rate of change in real GDP over time (usually one year). As the footnotes indicate, the growth data in Table 12.1 has been corrected accordingly. It is, therefore, a clear indicator of **boom** or **recession**: and Table 12.1 shows that apart from the severe recession experienced during 1991, all the years displayed had positive growth. A fuller coverage of GDP and how it is calculated is given in Chapter 13.

External Balance

All international economic transactions are recorded in a country's **balance of payments** statistics. The ideal situation represents a position in which, over a number of years, a nation spends and invests abroad no more than other nations spend or invest in it. Economic transactions with other nations can occur on many levels and, for accounting purposes, these transactions are often grouped into three categories: current account, financial account and official financing. Of these three, the most widely quoted is the current account. This involves all transactions relating to the exchange of visible goods (such as manufactured items, which would include building materials), the exchange of invisible services (such as overseas work undertaken by consultants) and investment earnings (such as profits from abroad).

Clearly, in any one year, one nation's balance of payments deficit is another nation's balance of payments surplus – ultimately, however, this is not sustainable and, in the long run, debts must be paid. The data in Table 12.1 show a worrying trend, in so far as the UK current account figures are all negative amounts. However, in addition to buying and selling goods and services in the world market, it is also possible to buy and sell financial assets and these are recorded separately in the financial account. The UK's annual position on its financial account is usually positive. A further qualifying remark regarding foreign trade is to recognise that balances of payment figures are notoriously difficult to record accurately. (In fact, of all the statistics shown in Table 12.1, the balance of payments estimates are subject, by far, to the biggest amendments.) In practice, therefore, statistics relating to the external balance need to be considered in a broader historical context.

Table 12.1 UK macroeconomic statistics

There are various sources for this data, and we have mainly used those hyperlinked from the LTSN site (see web reviews, page 180). Three points need to be emphasised: economic data is subject to revision, it is calculated in different ways by individual nations, and proper comprehension relies on footnotes.

	1990	1991	1995	2000	2001
Inflation ¹	7.7	6.5	3.5	3.0	1.8
Unemployment ²	1.7	2.3	2.3	1.0	0.9
Economic growth ³	0.8	-1.4	2.8	3.1	1.9
Balance of payments ⁴	-22.3	-10.7	-9.0	-19.2	-20.4

Notes: 1 Retail prices (percentage increase on previous year)

2 Total unemployment (annual average, in millions)

3 Annual percentage increase in real GDP

4 Current account (total for whole year, £ billions)

Protection of the Environment

The environment has gained a high political profile in recent years, and there is a recognition that a healthy economy depends upon a healthy resource base. Indeed, we have already reiterated several times since Chapter 2 that protection of the environment, and its enhancement, forms an important strand of the sustainable development agenda. We have also examined (particularly in Part B) the problem that – left to their own devices – markets cannot deal effectively with environmental impacts on third parties. Consequently, governments are increasingly having to intervene to influence resource allocation, preserve biodiversity and reduce pollution. At present, there is a broad-ranging debate arising from concerns that some economic activity damages the environment, and politicians are beginning to consider environmental protection together with other macroeconomic goals.

However, there is no still agreed way of monitoring performance towards the environmental protection objective and so there is no indicator for this objective in Table 12.1. We have already discussed some of the problems of integrating environmental costs into the marketplace and we will briefly consider the implications again when considering the measurement of national output in Chapter 13.

PRIORITIES: AN HISTORICAL PERSPECTIVE

The order of priority that these five macroeconomic objectives are given depends on the government in office. But all governments, in all nations, ultimately seek these objectives in their quest for macroeconomic stability. Indeed, since the end of the Second World War, there has been a consensus that governments should take action to stabilise economic activity. For example, the White Paper on Employment published in May 1944 stated that the government accepts responsibility for the maintenance of high and stable levels of growth and employment, and these themes dominated government agendas in the twentieth century.

Since the 1980s, however, the order of priority has changed and governments have subsequently made a more concentrated effort to curb inflation. For example, in his 1998 budget statement, the Chancellor of the Exchequer Gordon Brown explicitly stated that: 'Price stability is a precondition for high and stable levels of growth and employment.' As the political and economic scene evolves, it is possible that during the twenty-first century, the objective of protecting the environment may sufficiently raise its profile to demote inflation, employment and growth from their current positions at the head of government economic objectives. In short, while there may be some doubt at present about the priority attached to sustainable development, its momentum is gathering speed.

Key Points 12.1

- ☆ To achieve economic stability, five main macroeconomic objectives are pursued: (a) full employment, (b) stable prices, (c) external balance, (d) steady growth and (e) environmental protection.
- ☆ The order of priority accorded to these macroeconomic objectives depends on the government in office.

GOVERNMENT POLICY INSTRUMENTS

In their attempts to achieve their macroeconomic objectives, all governments, regardless of political persuasion, employ the same types of policy instrument. Again, it is only the emphasis that seems to change. These instruments can be grouped into three broad policy categories:

- fiscal policy
- monetary policy
- direct policy.

Fiscal Policy

In the UK, fiscal policy emanates, on the government's behalf, from HM Treasury. **Fiscal policy** consists largely of taxation (of all forms) and government spending (of all forms). The word fiscal is derived from the Latin for 'state purse' – and this is most appropriate as taxation is the main source of income from which governments finance public spending. In short, fiscal policy is concerned with the flow of government money in and out of the exchequer.

Important elements of the current fiscal framework are to make sure that both sides of the government balance sheet are managed efficiently. Any public sector debt must be held at a prudent and stable level in relation to GDP, and borrowing is only acceptable to cover capital expenditure. In technical terms, these two Treasury rules are:

- the **golden rule**, which states that over the economic cycle the government can only borrow to invest and not to fund current spending
- the **sustainable investment rule**, which states that over the economic cycle public sector debt expressed as a proportion of GDP must be held at a stable and prudent level.

These two rules provide a benchmark against which the government can judge its fiscal performance. They also establish a stable framework for the broader economy, and remove much of the instability created by previous fiscal regimes. A credible and trustworthy fiscal policy is recognised as important in achieving economic stability and growth. The International Monetary Fund (1998) has published a code of good practice on fiscal policy. This code sets out measures that the International Monetary Fund would like countries to adopt. It praises the UK's fiscal management as being exemplary in terms of transparency, stability, fairness and efficiency.

Monetary Policy

Monetary policy is implemented in most countries by a **central bank**, such as the Bundesbank in Germany, the Federal Reserve in the USA, and the Bank of England. In the UK, prior to 1997, monetary policy was set by the government – in other words, the Bank of England simply followed government instructions. In May 1997, the government established a new monetary policy framework, transferring operational responsibility to an independent **monetary policy committee** (MPC). The committee is responsible for setting interest rates each month to meet the government's overall inflation target. This inflation target is confirmed in the Budget each year and, at present, the target is for a 2.5 per cent increase in the annual retail price index excluding mortgage interest rates (RPIX). (We explain in more detail how inflation is measured in Chapter 14.)

The ten member monetary policy committee consists of experts drawn from outside and inside government circles. Five members are from the Bank of England (the governor, two deputy governors and two other bank officials), four 'outside' members are appointed for their expertise, and there is one representative from the Treasury who is allowed to participate in the debate but has no vote. The committee has a very specific and important role and it is governed by an organised and

accountable process. At its monthly meetings, the panel of experts carry out in-depth analysis of a wide-ranging set of data. For example, recently published monetary policy committee minutes suggest that the analysis includes the general state of the world economy, trends in domestic demand, the labour market, the housing market and the financial markets, and last, but by no means least, various measures of inflation and costs in specific sectors of the economy. The committee works from the premise that interest rates represent the cost of activity in the economy and, therefore, interest rates affect prices and aggregate demand – and we shall briefly extend this explanation in Chapter 14.

To enable the Bank of England to concentrate on issues relating to interest rates, it no longer has responsibility for supervising commercial banks and other financial intermediaries. This supervisory function is now carried out by a newly established **Financial Services Authority**.

CO-ORDINATION OF FISCAL AND MONETARY POLICY

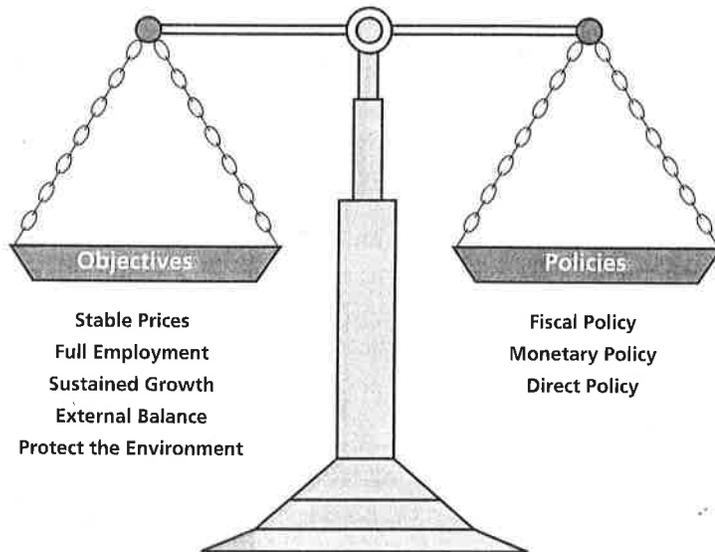
An important point to note at this juncture is that fiscal and monetary policy are equally important in any government's attempts to manage the macroeconomy. A change to either policy has broad effects on many of the core macroeconomic objectives. Consequently, all governments employ both fiscal and monetary instruments; although the emphasis alters from government to government. Until 1997, the Chancellor of the Exchequer directed the operation of both UK fiscal and monetary policy. Although this theoretically meant that there could be a high degree of co-ordination between both arms of macro policy, in practice this was often not the case. The present government prides itself on the levels of stability that have followed its new regime, and certainly there is now a greater clarity of roles and responsibilities between the Bank of England (UK's central bank) and the Treasury.

Direct Policy

Many other government economic policies tend to be more 'objective specific' compared with the broad macro fiscal and monetary policy options we have considered so far. We refer to these instruments as **direct policy**, but it is also known as direct control or direct intervention. A feature of this type of policy is that it tends to have less impact on overall market prices than the broad macro changes to tax or interest rates.

Direct policy tends to be of a legislative nature. Conventional economic textbook examples include legislation designed to control prices, wages or imports to assist with the stabilisation of prices and trade; legislation to support research and development, education and training to influence long-run growth; and general support to encourage small businesses. Good examples of direct policy within the area of construction economics include building and planning regulations to protect the environment, and specific initiatives such as the Rethinking Construction movement (the Egan Report) and the sustainable construction agenda introduced to change cultural attitudes towards productivity, safety and the environment. These initiatives are aimed at stimulating growth, stability and environmental performance within the sector.

Figure 12.1 Government objectives and government policy



MACROECONOMIC OBJECTIVES AND POLICY

Effective macroeconomic management is not an easy task. The basic objectives and policies are summarised in Figure 12.1. The scales are used to imply that there are trade-offs to be made between policy and objectives. Trade-offs, however, also occur between one objective and another, and one policy and another.

Let us briefly consider one scenario of macroeconomic instability as an example. Suppose interest rates are increased as part of an attempt to reduce spending and prevent further pressure on price rises. As a result, consumer spending is cut back – an action which may reduce employment opportunities. An increase in unemployment would put a strain on fiscal policy as the unemployed would no longer pay income tax (reducing government revenues) and receive benefits from the state (increasing government spending). The **public sector net cash requirement** (PSNCR) – the government's 'overdraft' – could increase. In turn, this may necessitate government spending cuts in other areas, leading to further unemployment. As output falls, then obviously economic growth slows down. Yet, as economic growth declines, less environmental degradation occurs. This brief scenario:

- highlights the complex nature of macroeconomic management
- emphasises the potential incompatibility of some macroeconomic objectives and instruments.

Treasury economists would claim that this scenario is now unlikely – arguing that they have learnt key lessons from past policy experience – but they would not dispute the difficulty of the task that confronts them. As Treasury advisers Balls and O'Donnell (2002: 2) admit: 'Fiscal policy is complicated as there are multiple

objectives and multiple instruments.' This difficulty is compounded by the fact that monetary decisions are taken monthly, but fiscal decisions are effectively only made annually in the government's Budget.

Key Points 12.2

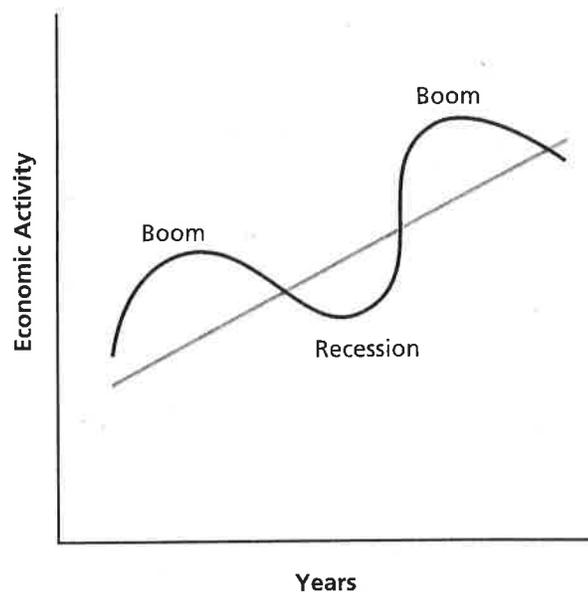
- ☆ All governments utilise a combination of fiscal policy, monetary policy and direct policy.
- ☆ Fiscal policy is concerned with government expenditure and taxation.
- ☆ Monetary policy is concerned with achieving price stability through setting interest rates.
- ☆ Effective management of the macro economy is difficult, especially as some of the objectives are incompatible.

MACROECONOMIC MANAGEMENT

Most economies aim to increase their rate of output each year. This has been achieved in the United Kingdom – on average, during the last 100 years, there has been a 1.5 per cent annual increase in economic activity. Unfortunately, however,

Figure 12.2 Business fluctuations

The blue line represents the long-term growth trend around which economic activity fluctuates.



long-term growth is not achieved at a steady rate, and there are always periodic fluctuations above and below the general upward trend – this concept is portrayed in Figure 12.2. These fluctuations are related to activity in the broader economy.

At times, the overall business climate is buoyant: few workers are unemployed, productivity is increasing and not many firms are going bust. At other times, however, business is not so good: there are many unemployed workers, cutbacks in production are occurring and a significant number of firms are in receivership. These ups and downs in economy-wide activity used to be called ‘business cycles’, but the term no longer seems appropriate because *cycles* implies predetermined or automatic recurrence and, today, we are not experiencing automatic recurrent cycles. The contractions and expansions of economies in the late twentieth and early twenty-first century vary greatly in length, so they are best referred to as **business fluctuations**. Inevitably these fluctuations affect all markets and, consequently, governments are concerned with minimising their effects.

Interpreting Business Fluctuations

There is a collection of economic statistics that can indicate where we are, where we’ve been and, most importantly, where we seem to be going. Their origin date back to the 1960s and they are still referred to as **cyclical indicators**. They enable governments to predict changes that are happening in an economy. These predictions are based on a composite set of statistics that are regarded as running ahead of the general economic trend. This is because things do not happen simultaneously – some indicators may point in an upward direction while others portray a downward trend especially at the ‘peaks’ and ‘troughs’ (the turning point) of a cycle.

Statistics that are assumed to precede the general trend of the economy by changing six-to-twelve months ahead of the main trend are referred to as **leading indicators**. This group is broken down into two subgroups: a longer leading index (which looks for turning points about one year ahead) and a shorter leading index (which indicates turning points approximately six months ahead). Examples of leading indicators are housing starts, new car sales, business optimism and the amount of consumer credit. **Lagging indicators**, by contrast, alter in retrospect, usually about one year after a change in the economic cycle – they confirm what we already know and, in forecasting terms, are not so important. Examples of lagging indicators include unemployment, investment in building, plant and machinery, levels of stock, and orders for engineering output. Economic statistics that are thought to trace the actual cycle are called **coincident indicators** and the obvious example is GDP figures.

Economic Forecasting

The interpretation of economic events is a complex process, especially as macroeconomic policy instruments can affect several variables at once. To take the simplest example, some cynical forecasters are quick to suggest that the sight of an increasing number of cranes on the skyline, visible from their office window, means that we are about to witness the start of the next recession. But this would be a ridiculous suggestion as there are many other variables that need to be used as a

basis for forecasting. Indeed the art of forecasting involves completing a picture using as much existing data as possible and combining this analysis with anecdotal evidence to arrive at an overall view. To avoid too many subjective judgements, models tend to be computer based, using mathematical equations to link a number of economic variables. For our purposes, these variables can be categorised into two main types. **Exogenous variables** are *external* to the economy in so far as they are determined by world events and policy (examples include oil prices and exchange rates). **Endogenous variables** are dependent on what goes on within an economy (examples include employment and inflation). There are more than 120 exogenous variables, and hundreds of endogenous ones – and the larger traditional models of the macroeconomy contained upwards of a thousand relationships. The present trend, however, is for models to be smaller and rarely exceed twenty core equations.

Understandably, since it is difficult to predict accurately the behaviour of millions of consumers and businesses to the last detail, economic forecasts are often wrong. Furthermore, forecasts are limited, since they rely on assumptions about policies that may need to change owing to sudden events or revised statistics. There are also problems relating to time lags, since it often takes years for a specific monetary or fiscal instrument to fully work through an economic system.

The important point, however, is the message conveyed by the forecast; the trend does not have to be 100 per cent accurate. Forecasting models are no different from any other economic model in that they attempt to simplify reality. In the case of the economy, this is a complex reality and a forecasting model only identifies, measures and monitors the key variables. Understanding half of the picture, however, is better than not seeing any of it at all.

Managing the Construction Industry

As you might expect, fluctuations in construction output share a similar pattern to the broader economy and they are referred to as **building cycles**. Interestingly, economists have a long history of studying building cycles, though not because they are particularly interested in the construction industry but because there is a strong possibility that it may contribute to a better understanding of business fluctuations. The symmetry between business fluctuations and building cycles is, however, complicated by the fact that economic development is usually associated with a shift from investment in new construction to spending on repair and maintenance. In other words, as GDP increases the proportion of new construction work decreases. Bon and Crosthwaite (2000) confirmed this pattern; their international review demonstrated that there is an inevitable decline in the share of construction in GDP as economies mature. In fact, it has been observed that newly developing countries experience up to double the rate of expenditure on construction as their more developed counterparts. We shall explore this further in the Chapter 13.

According to Ive and Gruneberg (2000: 248) another notable comparison between the construction sector and the rest of the economy is that **building cycles** have shown far greater amplitude than the equivalent cycles in general business activity. In other words, periods of decline and expansion are far more rapid in

construction than in the general economy. There is, therefore, a unique and distinctive situation in construction – as the long-term trend is for changes in construction output to become flatter as economies mature, yet the variation from year to year can be quite volatile.

This line of analysis is not meant to portray a depressed industry, as construction is, without doubt, a permanent and important sector of any economy. Indeed, in Chapter 13, we will argue that it is possibly the most important sector. It is certainly not like other sectors that may expand and contract and then disappear. The construction sector always has work – to maintain existing stock and to replace demolished stock and construct new stock – even if it may be at a declining rate.

From the perspective of managing the economy, the construction industry is important and most developed economies have a government department or commission to co-ordinate activities in the sector. In the United Kingdom, there are many government interactions with the industry. The departments concerned with roads, housing, health, education, energy, defence and the environment procure products from the industry – it is an oft-quoted statistic that around 40 per cent of construction activity is derived from the public sector. There is also a Construction Sector Unit based in the Department of Trade and Industry which aims to:

- increase the productivity and competitiveness of the industry
- provide effective links between the industry and government
- encourage the industry to contribute to sustainable development.

In effect, this means that the industry has representatives at government level to speak on its behalf and the government has a mechanism to deliver its messages from the top down. The main day-to-day functions of the unit are summarised in Table 12.2.

Table 12.2 Functions of the DTI's Construction Sector Unit

-
- ✓ Improving finished construction products
 - ✓ Improving the construction process, technologies and techniques
 - ✓ Tackling people issues, such as recruitment, health & safety, training & education
 - ✓ Promoting and sponsoring research and innovation
 - ✓ Improving awareness of the benefits of information technology
 - ✓ Reducing the impact of construction on the environment
 - ✓ Promoting overseas activities by the construction industry
 - ✓ Assisting small construction firms through the Best Practice Programme
-

Source: Adapted from DTI (2002)

Key Points 12.3

- ☆ Most modern economies achieve long-term growth, but the pattern is not steady as there are characteristic periods of fluctuation above and below the general upward trend (see Figure 12.2).
- ☆ Leading (cyclical) indicators are of particular significance in macroeconomic forecasting as they change six-to-twelve months ahead of the main business trend.
- ☆ Models used for forecasting and policy evaluation are based on computer programs. In the past, these have comprised upwards of a thousand equations linking endogenous and exogenous variables.
- ☆ The symmetry between business fluctuations and building cycles is complicated. Construction output declines as a percentage of GDP as economies mature, yet the variation from one year to the next can be quite volatile.
- ☆ Most developed economies have a government department or commission to co-ordinate activities in the construction sector.

The construction industry is an important focus of government policy. This is largely due to the recognition of the importance of construction to national economies. Broadly defined, the construction industry – including manufacturers of building products, equipment and components, and the various professional services provided by architects, surveyors, engineers and property managers – typically accounts for about 15–16 per cent of total annual economic activity. (You may remember that we compared broad and narrow definitions of construction activity in Chapter 1; and it may be here useful to review Key Points 1.3.)

Official statistics, however, generally tend to restrict the construction sector to the narrower definition of the industry, estimating the activity of firms that construct and maintain buildings and infrastructure – that is, just those businesses that undertake on-site activities. Consequently, the share of total annual economic activity attributed to construction by the official statistics in the fully industrialised countries is now rarely larger than 12 per cent and usually in the 7–10 per cent range. In the 15 countries of the European Union, the construction sector accounted for 9.9 per cent of economic activity on average in 2001. Note though, as we explained in Chapter 12 (see Key Points 12.3), that construction output as a proportion declines as countries' economies mature.

Apart from the industry's contribution to the total economic flow, it also has a significant impact on living standards and on the capability of society to produce other goods and services. In other words, construction is important to the economy because it produces investment goods. These are products that are not wanted for their own sake, but on account of the goods and services that they can create. Across the 15 member states of the European Union, construction counts for 49.2 per cent of all investment goods. Construction also can have extremely significant effects on the level of employment as it tends to be more labour intensive than other sectors. In fact, in European terms construction is the largest industrial employer, representing nearly 12 million jobs. (All statistics are taken from the European Construction Industry Federation (FIEC 2002).)

In this chapter we explore the relationships between the construction industry, other sectors and the national economy. As the contrast between the broad and narrow definitions of the industry illustrates, there are many sectors closely associated with construction activity. A case can also be made that construction indirectly affects and supports activities in the financial, manufacturing, wholesale, retail, residential and service sectors. Consequently, data for construction-related activities is frequently muddled into manufacturing and service industry surveys. These direct and indirect relationships have important implications for management of the macroeconomy and their analysis is facilitated by the annual publication of **national accounts**.

MEASURING ECONOMIC ACTIVITY

The national accounting framework provides a systematic and detailed description of the UK economy and, by following agreed international accounting conventions, it enables comparisons to be made with other countries. It is not our intention to delve into the minutiae of this system, but just to establish the general measurement concepts necessary to discuss the broader role of construction.

To begin the analysis, we consider a simple economy without a government sector, a financial sector or an overseas sector – that is, our starting point is a simple two-sector model economy and we analyse only the relationship between households and businesses. The complications of the real world will be considered later. We have already portrayed economic activity using this type of a model in Chapter 1 (see Figure 1.4), and for convenience a modified version is presented in Figure 13.1.

To make our starting model effective, we make these assumptions:

- households receive income by selling whatever factors of production they own
- businesses sell their entire output immediately to households, without building up any stocks
- households spend their entire income on the output of the businesses.

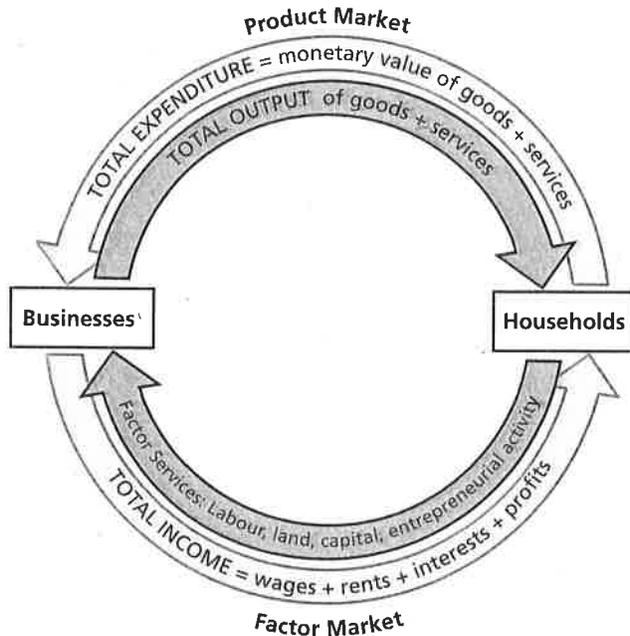
These three assumptions seem realistic. Businesses will only make what they can sell. Production does involve paying for land, labour, capital and enterprise, and these services generate income payments – rent, wages, interest and profit – which, in turn, are spent. The model of the circular flow outlined in this way suggests that there is a close relationship between income, output and expenditure. These relationships are presented in a traditional format in Figure 13.1.

From Figure 13.1, it is clear that businesses reward the owners of factors of production (land, labour, capital and enterprise) by paying them rent, wages, interest and profit and, in turn, these factor rewards (incomes) form the basis of consumer expenditure. This model shows that it is possible to measure the amount of economic activity during a specified time period by adding up the value of total output, or total income, or total expenditure. In effect, it is only necessary to adopt one of these three approaches since conceptually they are identical – and even in the actual national accounts they rarely differ by more than 0.5 per cent. The small discrepancy is due to each of the totals being calculated using different statistical methods.

To get a better idea of the magnitude of the numbers involved, readers are advised to look at a copy of the *UK National Accounts* (ONS 2002). Table 1.1 and Table 1.2 of the UK edition summarise all three methods of measurement – namely the **output approach**, the **expenditure approach** and the **income approach**. By analysing these statistics, it is possible to gain a good insight into the UK economy, especially as the data covers the last 18 years. Although very few people actually study the detailed breakdown of the accounts from cover to cover, they are an essential data source for anyone concerned with macroeconomics. Indeed, the national accounts are far more important than just indicating changes in GDP; they form a central reference for those who wish to broaden their understanding of the economy and its measurement.

Figure 13.1 The circular flow of income, output and expenditure

The diagram highlights two flows: a monetary flow and a real flow of goods and services. The two lower flows indicate the factor market – households exchange their factors of production with businesses in return for payment. The two upper flows show the product market – businesses provide a flow of goods and services in return for monetary expenditure.



GDP and Growth

Before considering any figures, however, we must fully understand what they convey and the significance of any changes in their size. In simple terms, **gross domestic product** (GDP) can be regarded as the annual domestic turnover; or, to employ the analogy used in Chapter 12, the result of a giant till ringing up all the transactions that occur within a specific territory. In formal terms:

GDP represents the total money value of all the production that has taken place inside a specific territory during one year.

An alternative measure is **gross national income** (GNI). This is very similar to GDP, but includes a net figure for employment, property and entrepreneurial income flowing in and out of a nation's economy from overseas – in other words, GNI aggregates all the activity that generates income to a specific nationality. In practice, GDP and GNI represent very similar amounts; for example in 2001, GDP in the UK totalled approximately £988 billion and GNI was £6 billion more at £994 billion. In European states, GDP and GNI rarely differs by more than 1 per cent, but the difference may be substantially larger in less developed economies.

When GDP figures are adjusted from current prices to constant prices, to allow for inflation, it is possible to calculate the **real value** of any change in economic activity between one year and the next. Effectively, economic growth can only be declared if 'real' GDP has increased. If real GDP has declined, this is described as a **recession**. In the majority of years during the last half-century the recorded figures have been positive.

Since the UK shares a common set of accounting conventions with other countries, we can make international comparisons of GDP and GNI. Some figures are shown for five selected countries in Table 13.1. The final column, which shows GDP growth, is obviously expressed relative to economic activity in the previous year. The term 'real' emphasises that inflation has been removed from the calculation, with each year's GDP values being expressed at an agreed base year (to convert current prices to constant prices). Worldwide economic activity tends to be on an upward path and, as Table 13.1 shows, all the selected economies grew strongly in the year 1999–2000. In particular, there were big increases in Singapore and China, although both countries were growing from a relatively low economic base. To facilitate international comparison it is necessary to take into account the size of the country. This is achieved by expressing GDP or GNI on a **per capita** basis, by dividing total GDP or GNI by the total population to arrive at an amount per head (see the dollars per capita column in Table 13.1).

Table 13.1 Macroeconomic statistics for selected economies

Countries in rank order	Gross National Income (GNI)		GDP
	Billions of dollars 2000	Dollars per capita 2000	% real growth rate 1999–2000
Japan	4,519.1	35,620	2.4
United States	9,601.5	34,100	4.2
Singapore	99.4	24,740	9.9
United Kingdom	1,459.5	24,430	3.1
China	1,062.9	840	7.9

Source: Adapted from World Bank (2002: Table 1.1)

The statistics in Table 13.1 are taken from *World Development Indicators*, a comprehensive set of data produced by the World Bank each year. The first table in the series always addresses 'The Size of the Economy'. The current publication lists data for 206 national economies in alphabetical order. In previous years, however, this data was presented in rank order according to GNI per capita. The concept of 'rank order' demonstrates the importance of these figures, as they are used to create a type of league table, in which (in 1999) Japan, the United States and Singapore come ahead of the United Kingdom, since the gross national income (GNI) divided by the population is higher in each of these countries. In fact, on a per capita basis, Japan ranks as the fifth richest country in the world. If 'total' GNI is the reference

point then Japan would be the second richest nation in the world after the United States, with a GNI in 2000 of \$9,602 billion. As you can see from Table 13.1, there is a huge difference between the largest and second largest economy (measured in terms of GNI). However, there are 282 million Americans and 127 million Japanese, and once population size is taken into consideration Japan can offer a higher material standard of living than the United States – \$35,620 compared to \$34,100 respectively. Indeed, despite a total GNI of less than \$100 billion, Singapore's small population (of slightly more than three million) brings it into the high-income bracket. At the other extreme, China with the highest population in the world is relatively poor, and has a per capita income of \$840. According to the World Bank, there are more than 50 low income countries with per capita GNI less than \$755, and the very poorest countries have an annual income as low as \$100 per capita. This is far less than many students in the Western world earn per month even while they are studying.

GDP and Construction

Construction is a significant part of the total economy. In 2000, construction in the narrowest sense of the definition produced about 7 per cent of UK GDP. In comparison, manufacturing produced 17 per cent of GDP, while mining and quarrying accounted for almost 3 per cent, and agriculture just 1 per cent. The lion's share of economic activity fell into the service category, which broadly defined to include wholesale and retail sectors, accounted for more than 71 per cent of GDP (OECD 2001).

In newly developing countries, the construction sector can contribute as much as 20 per cent to GDP because it accounts for a significant amount of investment during a country's development. As industrialisation proceeds, factories, offices, infrastructure and houses are required and construction output as a percentage of GDP reaches a peak. In other words, construction is responsible for the output of buildings and infrastructure upon which most other economic activities depend.

Once an economy has developed, the demand for construction products declines and construction output as a percentage of GDP tapers off. In an industrialised nation the building stock is well developed, so the need to add to it is less. Much of the infrastructure and many of the buildings may be ageing, but the requirement for new build work is generally smaller – however, there is likely to be a far greater need for repair and maintenance work. Generally, therefore, the higher the GDP per capita, the higher the proportion of repair and maintenance work in the construction sector.

An interesting contrast is offered by simply comparing construction output in West and East Europe. In Western Europe, the construction market increased annually by 1.7 per cent on average in the period 1996 to 2000 compared with an average annual growth in GDP of 2.6 per cent. In short, GDP growth exceeded construction output growth by almost 1 per cent over the five-year period. In stark contrast, the Eastern European countries, making their transition towards market economies during the same period, experienced an average annual growth in

construction of 5.2 per cent compared with an average annual growth in GDP of 4 per cent. In other words, construction increased between 1996 and 2000 at a faster rate than the whole economy. (This data is sourced from the Euroconstruct website, see page 180 for details.) The relationship between GDP and construction output is discussed further in the three case studies that conclude this chapter.

We end this section by entering a caveat about construction data. It must always be borne in mind that, of all sectors, construction is the most difficult to estimate. The problem is twofold. First, the construction industry comprises a very large number of small geographically dispersed firms, carrying out a large proportion of small projects. This makes compiling comprehensive data sets difficult enough for government agencies monitoring the industry. Second, alongside the official activities 'put through the books' and recorded in national accounts, there is a significant informal economy – unofficial work carried out for cash in hand (and the associated conundrum of DIY). In fact, some countries have begun to estimate a value for this informal output. In France, for example, it is estimated to represent as much as 23 per cent of the official construction activity; in Italy it is 17 per cent; in Spain 15 per cent; and in the UK it is thought to be around 10 per cent (DLC 1998: 28). In Eastern Europe, the informal sector in construction is estimated to represent an even bigger problem, with Hungary estimating that 28 per cent of construction work is not recorded in the official statistics and in Poland the equivalent unofficial activity is around 20 per cent of total construction output (DLC 1998: 10).

Key Points 13.1

- ☆ The construction industry can be defined in many ways. Broad definitions suggest that the construction industry typically accounts for 15–16 per cent of total annual economic activity; on the narrower definition, it only accounts for about 10 per cent.
- ☆ The simple circular flow model highlights (a) that households sell factors of production in return for incomes, (b) that businesses sell goods and services to households, and (c) that there is a close relationship between income, expenditure and output.
- ☆ National accounts measure the annual level of economic activity, and economic growth is identified by changes in 'real' GDP.
- ☆ GDP represents the total money value of all production created within a country during a year. GNI includes the income generated for the nationals of that country by overseas activities.
- ☆ There is a relationship between the level of construction activity and a country's stage of development. Construction can be regarded as the engine of economic growth.
- ☆ In most countries, informal output means that construction activity is under-reported in national accounts.

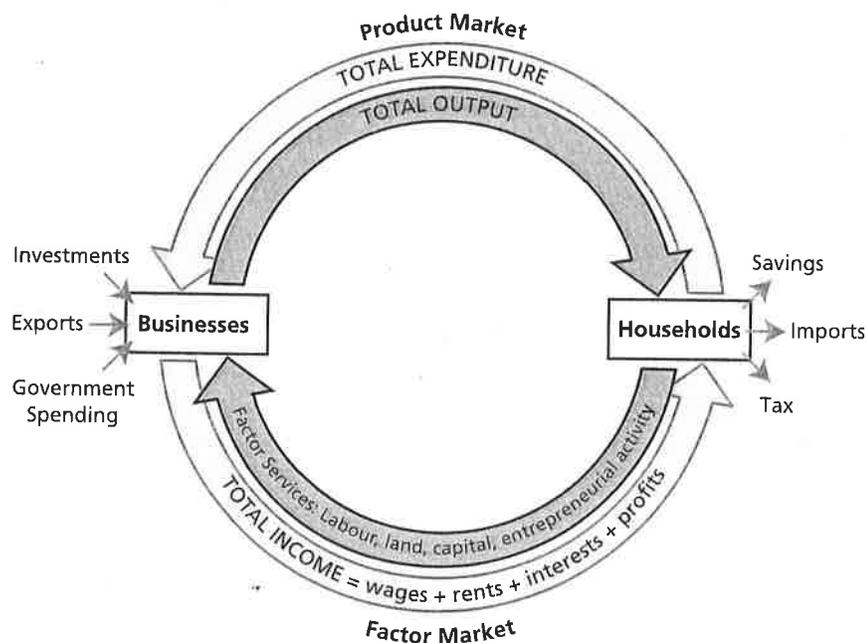
FROM CIRCULAR FLOW MODEL TO REALITY

The two-sector circular flow model presented in Figure 13.1 suggests that the amount of money flowing around an economy is always constant – the GDP figures never change; economic growth is always equal to zero. This is because the model is based on the assumption that expenditure levels precisely determine income levels, and expenditure is in turn determined by income, and so on. In this theoretical model of a two-sector economy, income and expenditure levels are permanently static: there is no growth and no decline. This economy could be classed as being in neutral equilibrium.

In reality, however, every economy experiences leakages (withdrawals) from the circular flow. These occur through the sectors we initially specifically excluded: overseas, financial institutions and government. Simultaneously, there may be injections of funds into the economy through these sectors, for example from exports (that is, earnings flowing in from abroad).

Figure 13.2 The circular flow model with injections and leakages

To complete the circular flow diagram, leakages need to be subtracted as households save, spend money on imports, and pay taxes to the government. And injections need to be added as businesses benefit from investment funds, export earnings and government spending.



Leakages and Injections

Figure 13.2 extends the circular flow model to include leakages and injections. Three leakages from expenditure are shown: savings, imports and tax. Counterbalancing these leakages, there are three injections: investments, exports and government

spending. The decisions that determine the overall size of these leakages and injections of funds are carried out by different groups of individuals with different motivations. It is most unlikely, therefore, that leakages and injections will be equal and cancel one another out.

If the total level of leakages is greater than the level of injections, the economy will become run down, raising unemployment and reducing standards of living. To take an extreme example, if every household decides to spend its money on imports from abroad then this would represent a major leakage of funds from the domestic circular flow and a significant boost to other countries. Conversely, if the total level of injections is greater than the level of leakages, the economy will be boosted, increasing employment opportunities and raising the amount of national income.

EQUILIBRIUM OF THE MACROECONOMY

Equilibrium means a 'balanced state'. In the macroeconomic context, this means that income, expenditure and output levels continually adjust upwards and downwards to keep in line with one another. For example, when leakages exceed injections, expenditure on domestic output will be less than factor incomes. Consequently, firms will not receive sufficient revenue to cover their output costs. Stocks will accumulate and firms will cut back output and incomes until they equal expenditure again. A new level of equilibrium will have been reached.

It is the nature of imbalances between leakages and injections that prompt changes in output from year to year. These changes lead to different levels of income circulating within the economy – representing different levels of economic activity. The dilemma for economists, however, is that although all economies tend towards equilibrium, the associated level of activity is not always sufficient to support full employment.

It should be clear by now that national income analysis is one-dimensional, in so far as it focuses entirely on the monetary value of material goods and services. Whenever we discuss leakages and injections, the environmental dimensions (as covered in Part B) are ignored. The interaction between the economy and the environment is not effectively measured in conventional national accounts. In fact, any money spent on cleaning up the environment from pollution simply contributes to total expenditure in just the same way as money spent on dumping waste, dealing with crime or preparing military attacks. At present, all output is regarded as contributing to economic wellbeing. In historical terms, an explanation for this positive attitude to all output is due to its association with employment. This will become clearer in the next section.

Key Points 13.2

- ☆ Exports, investments and government spending represent injections to the circular flow. Imports, savings and tax represent leakages. The size of the injections set against the leakages determines the annual level of economic activity.

- ☆ All economies tend towards equilibrium but that does not guarantee full employment.
- ☆ Conventional national accounts do not systematically measure the interactions between the economy and the environment.

MANIPULATING THE LEVEL OF ECONOMIC ACTIVITY

In the last 50 years, there has been some debate between economists about the policies that should be adopted by governments to manage the economy. The discussion has proceeded in two main phases. During the years following the Second World War, the consensus of opinion seemed to be for an interventionist strategy. This approach was informed by Keynesian **demand management** theory. The major objective was to keep the economy running near full capacity without incurring wide fluctuations in output. During the last twenty or thirty years, the Keynesian consensus has given way to **supply-side economics**, with unfettered free markets providing the theoretical basis of the approach. The dominant economic objective of supply-side economics is to control inflation in order to achieve high and stable levels of growth and employment. These two contrasting approaches to managing the level of economic activity are considered below.

Demand Management

When a government is faced with a situation in which resources are unemployed and the economy is generally running below full capacity, it can intervene in various ways to reflate the economy. The easiest option is to increase its own spending, and thereby inject funds into the circular flow. This idea, known as demand management, was fashionable throughout Europe from 1945–1975. It was an attractive option because injections of government funds were seen to have a multiplier effect on national income level and employment.

THE MULTIPLIER THEORY

The theory of **multiplier** builds on the circular flow concept – on the idea that expenditure determines the level of output and its associated income. In other words, when people are employed they spend their wages on goods and services produced in other sectors of the economy which, in turn, generate employment and spending elsewhere, creating an upward spiral. Keynes argued that if the current amount of expenditure is insufficient to maintain full employment it becomes advisable for the government to intervene – or, to express it in journalistic terms, to ‘kick start’ or ‘pump prime’ the economy.

Consider this scenario: assume a government invests £40 million for a new road. This will cause expenditure and output to raise by the same amount. To increase output, more labour will be taken on. New firms may be started. The newly employed resources will be rewarded with incomes to the value of the initial injection. However, as this money circulates around the economy, some of the

£40 million will leak out of the flow in the form of savings, imports or taxes. Economists refer to this as the **marginal propensity to leak** (MPL). The concept of the margin – as we discussed in Chapter 7 – focuses on additional or incremental amounts. The marginal propensity to leak, therefore, represents the proportion of the ‘additional’ income that does not get used on consumption. If we assume an MPL of 25 per cent, we can quickly calculate that households will spend £30 million of their increased income on **consumer goods**. (Certainly if the recipients of income injected by government spending were previously unemployed, we would expect these households to spend any additional income coming their way on consumption rather than saving.) This additional spending will add a further boost to total expenditure. In turn, firms producing consumer goods will increase output, and they will take on more resources and have to pay out more in interest, wages and rent in order to earn more profit. Again incomes will increase. This will lead to successive rounds of further expenditure. If we continue to calculate the increase in additional expenditure occurring as a result of the initial additional government investment of £40 million, we find that national income is ‘pumped up’ by a significantly larger amount. In this example, it would actually be £160 million. The determining factor is the size of the leakage; since the multiplier is equal to the reciprocal of the MPL. In developed European economies the leakages are quite large and, accordingly, the multiplier effect is significantly smaller than our example suggests.

This scenario is not too far removed from the immediate post-war reality. The government policy was to invest in the construction industry to increase the general volume of economic activity. Construction was specifically chosen because in most countries it was, and still is, a labour intensive activity, and it plays an important role in the development of the productive capacity of the economy. In fact, many post-war economists regarded the construction industry as a ‘regulator’ of the economy. The European Commission (2001: 7) has recently estimated that one job in construction gives rise to two further jobs in the economy as a whole.

Aggregate Demand

A central part of Keynesian analysis is **aggregate demand** (AD).

Aggregate demand can be defined as the total spending on goods and services produced in a whole economy.

At the beginning of this chapter we considered total expenditures on a theoretical level in a two-sector economy. In such a model, aggregate demand would be equal to consumption expenditures (for example, on beer and chocolate) by households and investment expenditures (for example, on buildings and machinery) by businesses. In reality, however, we need to add government expenditures (such as on road construction) and export revenue from UK output (such as US purchases of Jaguar cars). Aggregate demand (AD), therefore, consists of four elements: consumer spending (C), investment spending (I), government spending (G) and expenditure on exports (X). Aggregate demand is the total of these four elements once one further adjustment is made: to be technically correct, spending on imports (M) from abroad needs to be subtracted as this is not money spent on UK products. It is traditional

for the shorthand notation to be used to express aggregate demand using the formula:

$$AD = C + I + G + X - M$$

At this juncture you could be excused the feeling of *déjà vu*. Earlier in this chapter we discussed national income accounting and derived a monetary value for economic activity. Aggregate demand is in fact analogous to GDP. Table 13.2 shows the components of UK aggregate demand in 2001.

Table 13.2 Measuring aggregate demand in 2001 market prices

Components of aggregate demand	$C + I + G + X - M = AD$
Related amount in £bn during 2001	$773 + 164 + 73 + 268 - 291 = \text{£}988 \text{ billion}$

Source: United Kingdom National Accounts (ONS 2002)
Note: All figures rounded to nearest £billion

Demand management techniques proved to be a difficult tool to use. One of the difficulties was the timing of the action. It becomes particularly difficult when the sector used for delivery is construction, as the time lags tend to be long and variable. A second and more obvious problem was overshooting – adding a too large injection which causes the economy to overheat. The subsequent excess demand achieves nothing except continually increasing prices – resulting in higher inflation. In short, it proved very difficult to use demand management techniques to shift aggregate demand to the precise level to secure full employment at the right time.

These problems were neatly analysed by Professor Frank Paish during the 1960s. He suggested that the problem with Keynesian demand management techniques lay with the concepts of productive capacity and actual output. He argued that by adding to productive capacity, you generate income before you generate actual output. Therefore, to achieve stability, Paish recommended maintaining a margin of unused productive capacity.

The focus has now shifted to concerns about potential output and actual output. Once spare capacity has been used up – and full employment of resources has been achieved – actual output will be restricted in the short-term. The answer to the problem, therefore, seems to involve ensuring an amount of unused productive capacity and/or increasing the potential output of an economy. To increase the level of output, at the full employment point, requires more capacity and this is determined by resources being used efficiently. Technically speaking, economists had become concerned about the supply side. Patricia Hillebrandt (2000: 66) has always regarded the capacity of the construction sector as a constraint and she has identified three episodes – in 1964, 1973 and 1989 – when the industry or its material suppliers were stretched to capacity. Each episode resulted in periods of sharp inflation.

Key Points 13.3

- ✧ During the years immediately following the Second World War, the strategy for manipulating economic activity was informed by Keynesian demand management theory.
- ✧ Governments wishing to slow down or speed up the rate of economic activity used demand management policy to affect the size of injections or leakages.
- ✧ An increase in government expenditure causes a multiplier effect on the level of national income. The larger the marginal propensity to leak, the smaller the multiplier effect.
- ✧ Aggregate demand is the sum of all expenditures in an economy. It is usually considered in four categories, and using the standard notation, defined by the formula $C + I + G + (X - M)$.
- ✧ Demand management techniques are closely associated with the problem of inflation.

SUPPLY-SIDE ECONOMICS

One of the main hallmarks of economic policy since 1979 has been concern over the supply side of the economy. The focus has shifted from government spending and aggregate demand to production and aggregate supply. **Aggregate supply** can be regarded as total production, and clearly many factors influence its size such as the level of profits, ease of movement into and out of markets, the level of wages, the efficiency of capital and labour, the level of fixed costs, etc. As a result, policy oriented to the supply side has given rise to measures to increase incentives within the economy. Indeed, economists concerned with this perspective seem to place more trust in market forces than government intervention. The *Statement of Intent on Environmental Taxation* (HM Treasury 1997) is an interesting example of this approach. This set out the UK government's intention to use the tax system to promote sustainable growth, by shifting the tax burden away from 'goods', such as employment, towards 'bads', such as pollution. The policy sought to achieve a 'double-dividend' – of increasing capacity and reducing environmental damage.

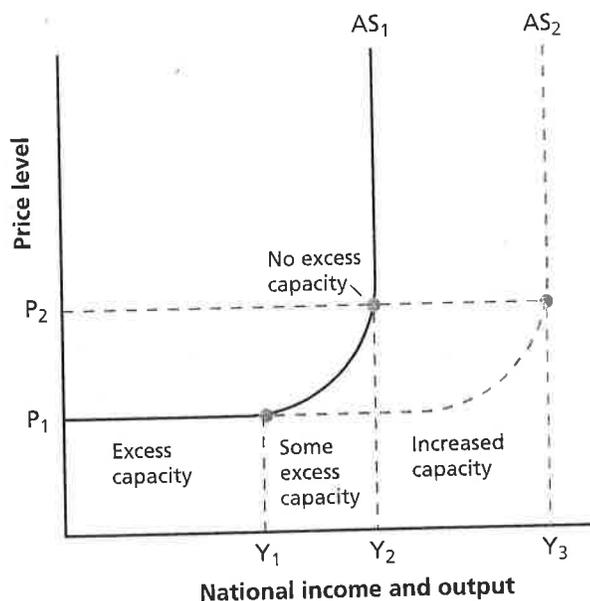
Supply-side policy, therefore, is geared to making markets work more efficiently. This has been achieved by reducing the structural rigidities that clutter many markets. For example, **wages councils** were stripped of many of their powers in the 1980s and formally abolished in 1993, trade union activities have been restricted and market competition has been opened up through privatisation and deregulation. Similarly, governments have made broad reductions in rates of income tax – from 33 per cent to 20 per cent at the basic rate and from 83 per cent to 40 per cent for the top rate – to provide more incentives for people to work harder. Indeed, there seems to be no market that has escaped from the plethora of supply-side measures.

Aggregate Supply

By devising supply-side methods to promote competition in as many markets as possible, governments believe they can reduce the money they spend on direct intervention and encourage the entrepreneurial spirit that drives production. In technical terms, this policy is designed to shift the aggregate supply curve to the right. This is demonstrated in Figure 13.3. An aggregate supply curve represents the relationship between the output firms would be willing to supply and the general price level.

Figure 13.3 The aggregate supply curve

At a price level of P_1 , the AS curve is a horizontal line up to the point where output is Y_1 . Then, there is an intermediate stage – some sectors of the economy are experiencing excess capacity, but others are not. At Y_2 there is no immediate capacity in any sector of the economy and prices rise. In the long run, however, it should be possible to increase productive capacity and shift the AS curve towards the right.



It would be nice to simply conclude that the aggregate supply curve slopes up because, the higher the price level, the greater the incentive for producers to produce more. But it must be emphasised that we are not talking about changes to individual specific prices – the vertical axis represents changes to the general price level; it is an index of the weighted average of all prices. In order to understand the true purpose of the aggregate supply curve, we examine four situations:

- 1 large amounts of unused capacity
- 2 full capacity
- 3 an intermediate range between the two
- 4 increasing capacity in the long run.

UNUSED CAPACITY

When an economy has many factories operating at less than capacity, there is a general under-utilisation of the productive capabilities and it is possible to increase output without any pressure on prices. If there is unused capacity, producers can increase supply without having to pay higher prices for factors of production. If they need more labour, they can hire someone who is unemployed – they do not need to pay higher wages to attract people. Providing there are significant levels of unemployment and unused capacity, per-unit costs of output remain the same, no matter what the volume of output. In these circumstances, we would expect the aggregate supply curve to be a horizontal line at the current price level. Consider a current price level of P_1 , as given on the vertical axis of Figure 13.3. The horizontal line labelled 'excess capacity' represents that part of the aggregate supply curve AS_1 where an increase in output causes no pressure on prices. Within this range, supply is perfectly elastic.

NO EXCESS CAPACITY

Now consider the other extreme, in which the economy is running at full capacity and there is no unemployment. In such a situation it is impossible for any additional output to be produced. There is only one thing that can happen – the price level can rise, but no further increases in output are physically possible. The aggregate supply curve has to be a vertical line, as shown at output rates Y_2 and Y_3 in Figure 13.3. At this point supply can be said to be perfectly inelastic; any price rises above level P_2 produce absolutely no changes to the quantity supplied.

INTERMEDIATE RANGE

When there is some excess capacity in parts of the economy but no excess capacity in other parts of the economy then, as production increases so-called bottlenecks or **supply constraints** may develop. As firms try to increase output they may experience shortages of some inputs, most frequently certain kinds of skilled labour. When this happens, firms can try to attract more of the scarce input by offering a higher price. They compete with each other for the limited supply of people with scarce skills, thus driving wage rates up. This raises their costs of production, and they then react by raising their prices whenever possible.

The shape of the aggregate supply curve in the intermediate range is explained by these bottlenecks. As the aggregate supply curve starts to slope up, it becomes steeper as full capacity output is approached because more and more supply constraints appear. These constraints force some prices to increase and, as output nears full capacity, sellers can put prices up without losing customers. Since the price level is an index of all prices, if some prices stay constant and some go up, the general price level will rise too. This means that if we increase production from output Y_1 in Figure 13.3 – at the end of the excess capacity output rate – price levels will rise along with national income. In this range, there is a positive relationship between national income and price level. As supply constraints become greater, supply becomes less and less elastic. Successive increases in spending lead to smaller and smaller increases in output and income, up until we reach full capacity.

INCREASING CAPACITY IN THE LONG RUN

In the long run, as technology advances and the stock of capital increases, it will become possible to increase capacity and produce more – so the vertical line showing full capacity output will shift gradually to the right. This is shown by AS_2 in Figure 13.3. The increases in national income and output from Y_2 to Y_3 are achieved by new capacity. This represents how, over a fairly long period, output can begin to increase and prices fall.

As far as construction is concerned, manipulating the supply side has led to the government's role becoming less transparent. Today, governments increasingly rely on subtle messages to improve the market efficiency of the construction industry by promoting ideas such as lean production, factory-built modular structures and partnering. The aim is to encourage construction to embrace technology and vertical integration, and to capture some of the advantages achieved by manufacturing at the site level. If the capacity of the construction industry could effectively increase, the overall aggregate supply curve would certainly shift to the right, enabling total output to increase without putting pressure on resources. This is because construction influences the capacity of so many other sectors of economic activity. The best evidence of increasing capacity and growth through hi-tech construction methods can be seen in Japan, which is why it is one of our three national case studies that conclude this chapter.

Obviously, governments want the aggregate supply curve continually shifting to the right to achieve sustainable growth and stable prices. Unfortunately, however, this is frequently complicated by a construction industry that seems wedded to low-tech approaches.

Key Points 13.4

- ☆ Since 1979, economic policy has been concerned with the supply side of the economy. The focus of government activity has shifted to production and aggregate supply.
- ☆ Economists have become increasingly concerned with the principles of microeconomics that underpin aggregate supply.
- ☆ Supply-side economics revolves around the freeing up of markets and the reduction of direct intervention by the government.
- ☆ The aggregate supply curve describes several stages based on different levels of capacity. The nearer the economy gets towards full capacity, the more likely inflation becomes (see Figure 13.3).

THREE CASE STUDIES

There is a close relationship between a county's construction sector and its level of GDP. This is partly because the construction industry involves the assembly of many different products from a large number of industrial sectors. As we suggested in the

introduction to this chapter, construction activities have far broader impacts than the main official statistics imply. Of greater importance, however, is the fact that construction provides the investment that underpins development, as it provides houses to live in, buildings to work in and infrastructure to support communication and transport. In fact, several studies have shown that the construction industry has significant linkages with other sectors of the economy. Consequently, it has become common practice to use the construction industry as some kind of regulator for the overall economy. The following three case studies demonstrate how this may be achieved in different cultures.

CASE STUDY 1: CHINA

The People's Republic of China is experiencing a building boom; between 1979 and 2000, economic activity in China increased by an average of 9.5 per cent annually. In fact, during the period 1991–1996, China was the fastest growing economy in the world with average annual growth rates nearing 12 per cent. As a result, the Chinese construction industry faced a significant increase in demand. The proportion of value added by construction to GDP increased from 6 per cent to 10 per cent. Employment in the industry doubled from a workforce of 17.3 million in 1985 to 35 million in 1997 – to put this in context, note that China has a total population over 1.25 billion and a 700 million strong labour force. (These statistics are taken from Han and Ofori (2001) – Reading 5 on page 229 is an extract from this paper.)

The construction industry is an important element in the transformation of China towards a more market-oriented system. For example, at the Chinese Communist Party meeting in 1994, construction was explicitly identified as one of the four pillar industries that could help China to begin a new cycle of economic growth. (The other three pillar industries were automobile manufacturing, oil and chemical refinery, and mechanics and electronics.) The focus on construction was supported by the establishment of a new government department. The ministry of construction has taken a lead role in implementing new strategies for the industry. These strategies include opening up construction markets, establishing a competitive bidding system, allowing autonomy in state-owned enterprises and eliminating bribery as a means of obtaining contracts, loans and materials. These policies have resulted in a substantial expansion in the number of Chinese construction firms, and they have been regarded as an important motor in driving economic growth. The Chinese government has been keen to avoid foreign domination, and although foreign investment is allowed, it is not permitted in contracts for the supply of water, gas or subway systems.

The Chinese construction industry still has a long way to go to reach world-class standards – but its contribution to the development of the Chinese economy has been important. As one of the leading Chinese academic experts has observed, the Chinese construction industry continues to face difficult challenges and it requires further reforms in the areas such as price mechanism, equipment, materials, quality and financing. However, China's construction industry, measured in terms of manpower, is easily the largest in the world and it has been responsible for creating high volumes of activity since 1980 (Chen 1998: 711).

CASE STUDY 2: SINGAPORE

In Singapore the construction industry accounts for an average of 7 per cent of the economy and employs about 10 per cent of the workforce. Compared to China, the Singapore construction industry is heavily reliant on imported materials and foreign workers. According to Chan (2002: 523), 25 per cent of Singapore's construction output is made up of imported goods and services and 69 per cent of the labour force (that is, about 80,000 people) are overseas workers. This heavy reliance by the construction sector on imports, of one sort or another, places a strain on Singapore's balance of payments. (For a complete understanding of macroeconomic impact of the construction industry, many issues need to be considered including – as Singapore fully demonstrates – the international dimension.) Construction ranks fifth in terms of its contribution to Singapore's GDP. Empirical results, however, demonstrate that following finance and business, the second biggest influence on the country's balance of payments is caused by changes in construction output (Chan 2002: 532). This scale of leakage of resources is usually more common in less developed countries, where deficiencies in local construction capacity and the subsequent dependence on imported materials, machinery and skilled labour notoriously runs up foreign debts and causes balance of payment problems. Singapore, however, is one of the most advanced economies in the world; it has certainly progressed beyond the industrial stage towards a knowledge-based economy.

This is the context for the current development of the Singaporean construction industry. And, setting an agenda for the twenty-first century, a government report has identified five important obstacles that the construction industry in Singapore needs to overcome. The report makes recommendations to address in turn each of these obstacles (Ofori 2002: 406).

- The image of the industry should be transformed from being perceived as 'dirty, demanding and dangerous' to one where it is viewed as 'professional, productive and progressive'.
- Construction must change from a 'labour intensive and low-skilled industry' to a 'knowledge industry'.
- Instead of being an industry based on '*in-situ* projects', construction should become a 'distributed manufacturing process'.
- Construction should shift from being an industry based on 'segregated activities' to a far more 'integrated process'.
- Construction should move from being low cost on the basis of low wages to attaining low cost through high production.

These five obstacles could equally apply to the construction industry of most developed economies; with, arguably, the only exceptions being the United States and Japan. In these two countries, information technology has been used to raise the level of integration, competition, professionalism and productivity. In fact, it has been suggested that in Japan productivity rates in construction are double the rate of efficiency in Singapore (Ofori 2002: 409).

CASE STUDY 3: JAPAN

During the last couple of generations, the Japanese have rapidly developed their country into one of the richest nations in the world and much of this success is attributed to Japan's active construction sector. Indeed, Japan is worthy of a case study not only because the Japanese construction industry is extremely efficient in terms of output, but it also because the sector is regarded as being 'unusually profitable' (Fraser and Zarkarda-Fraser 2001: 831). As a recent special supplement on the Japanese economy in *The Economist* (2002b: 7) oddly concluded it is 'not for nothing that Japan is known as the construction state'. This survey also noted how Japan was using the construction sector to soak up labour that was being laid off by other industries.

In the fastest growing, fully industrialised economies, construction rarely accounts for more than 10 per cent of GDP. However, when Japan was at the peak of its rapid urban development during the 1990s, construction – in the narrowest sense – accounted for about 12 per cent of GDP. The Japanese construction industry is in fact characterised by many exceptional features. Here we just give three of the most significant examples.

- The majority of commercial buildings are constructed for owner-occupiers rather than for speculative developers.
- The relationship between general contractors, specialist subcontractors, labourers and clients is frequently characterised in terms of collaboration and integration rather than conflict and fragmentation. In an analysis of the Japanese construction sector, Reeves (2002: 421) even goes as far as suggesting that the whole mechanism in the sector 'operates to provide mutual benefit to all of the players involved'.
- Firms compete on the basis of technology, in contrast to the usual price-based competition that drives the construction process.

It is this third point that makes Japan's construction industry unique. In most countries, construction is regarded as traditional, conservative, labour intensive and not particularly interested in innovation; in Japan, it is quite the opposite, the Japanese government regard 'hi-tech intelligent' buildings as central both to the nation's infrastructure and to the development of a knowledge-based economy. It therefore promotes technology use in the management of a building.

Technology is also embraced at the site level, where the construction of high-rise buildings utilises prefabrication, robotics, automation and information technology. Indeed, 'computer integrated construction' is becoming a key part of the corporate policy of several major Japanese contractors. As Professor David Gann (2000: 113) explains in his analysis of innovation and change in the global construction market: 'Rich Japanese companies invested heavily in electronic technologies for their new buildings. Moreover, government played a bigger role than elsewhere in sponsoring the concept of intelligent buildings. Japanese construction firms vied with electronics, telecommunications and office equipment manufacturers to produce prestigious buildings.'

This level of technological innovation is associated with a higher than usual commitment to research and development (R&D). In most OECD countries, R&D in construction rarely exceeds 0.4 per cent of the industry's total annual output. In the UK, it rarely exceeds 0.1 per cent. In Japan, it is usually above 1 per cent – and has exceeded 2 per cent. Compared to manufacturing, this is still very low – as generally manufacturing firms invest 3–4 per cent of their total annual output in R&D. The important point for our purposes, however, is that Japan again stands out as the exception to the general rule. It has developed six, very large, vertically integrated construction companies (Kajima, Kumagai-Gumi, Obayashi, Shimizu, Taisei and Takenaka) that believe in using technology to obtain competitive advantage. Again in contrast with other countries, construction research is concentrated in the private sector and there are more than 20 companies that possess their own technological research institutes. To finish with one final example, in the 1992–1993 financial year, Kajima – one of Japan's 'big six' – invested over £125 million in R&D. In contrast, in the same period, all the UK private contractors only managed a combined R&D spend of £17.5 million (Gann 2000: 198).

Nearly 10 years later, the *Rethinking Construction Innovation and Research* report regarded the total UK private sector construction R&D annual expenditure of £40 million as still being far too small given the size and significance of the sector (Fairclough 2002: 13). Interestingly, in the context of this text, Fairclough (2002: 30) emphasised that construction research was inadequate when compared to the important contributions the sector made to the UK's economic, social and environmental wellbeing, and its main conclusion and recommendation was the need for the government to increase its commitment to construction R&D. Fairclough (2002: 30) wanted to create what it called a 'virtuous circle...beginning with more and better focused R&D investment, allowing more innovation, leading to better profitability, and providing the additional capacity to invest in more R&D'. Japanese construction is the exception to the rule as it already has introduced this strategy and broken into the virtuous circle! To achieve the same level of progress in the UK, or elsewhere, government manipulation and/or funding would be necessary.

Conclusion

Governments have a central role to play in promoting change in the construction industry. In the period dominated by Keynesian policy (1950–1975) governments opted for direct intervention. Indeed, until the 1970s, 50 per cent of all construction work was purchased by the public sector in the UK. More recently, however, government policy has placed far greater reliance on laissez faire market forces. This has eroded the capacity of governments to directly control construction output. Consequently, most governments today facilitate changes within construction by acting as a catalyst or adopting co-ordination functions. As we have argued, however, the fragmented nature of the industry is a barrier to change – although, Japan is an exception, with private sector R&D driving the industry forward.

Modern governments have attempted to exercise their responsibility to the industry through a variety of policies, including encouraging environmental

protection, promoting competition, innovation and R&D, setting regulations relating to health, safety and buildings, and being a catalyst for promoting change. Approaches to encourage sustainable construction is an interesting example of how modern governments have attempted to manipulate activity and these are reviewed in the concluding chapter of this book.

Key Points 13.5

- ✧ Regardless of the level of economic development, and a nation's culture and tradition, the construction sector plays an important role in any economy.
- ✧ In China, Singapore and Japan, the construction industry has provided an engine for economic growth.
- ✧ Japan's construction investment in R&D is the highest of all OECD countries. In most countries, however, it is left to the government to initiate policies to promote long-term goals.



NEW YORK STATE WATER RESOURCES INSTITUTE

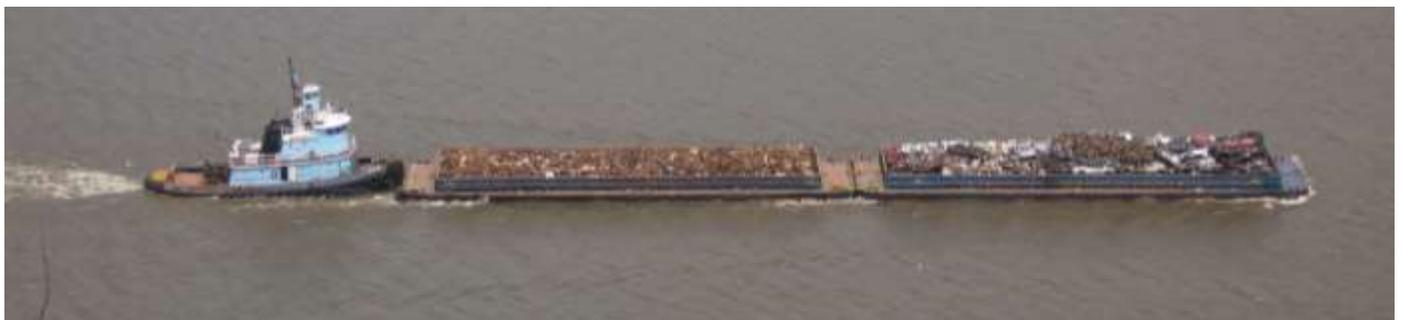
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Water Resource Infrastructure in New York: Assessment, Management, & Planning – Year 2

Prepared September 12th, 2014



Photos taken by Emily Vail and Joshua Cerra



The **New York State Water Resources Institute (NYS WRI)** and the **New York State Department of Environmental Conservation (DEC) Hudson River Estuary Program (HREP)** has undertaken a coordinated research effort on water resource infrastructure in New York State, with a focus on the Hudson and Mohawk River basins.

The primary objective of this multi-year program is to bring innovative research and analysis to watershed planning and management. In particular, WRI-HREP is working to address the related topics of water infrastructure, environmental water quality, and economic vitality, especially as they pertain to planning and management in the Hudson and Mohawk watersheds. The WRI-HREP program coordinates individual research efforts so as to fit within the context of, and be responsive to, New York State's growing concerns about aging public infrastructure, economic constraints on public investment, and the recent requirement for State planning agencies to incorporate principals of "smart growth" as promulgated in the 2010 Smart Growth Public Infrastructure Policy Act.

In the following pages we report on progress made in **year two (2013-2014)**. Projects are discussed within the following broad themes:

- 1) **Infrastructure Assessment** - Water-related infrastructure including water supply and wastewater treatment facilities, distribution networks, decentralized treatment installations, dams, constructed wetlands, "green" infrastructure, etc., and their current state and effectiveness at providing water and ecosystem services regionally at reasonable cost
- 2) **Economic Vitality** - Regional economic vitality with respect to water infrastructure and its effect on private and public investment and industrial development
- 3) **Integrated Management** - Integration of scientific, economic, planning/governmental and/or social expertise to build comprehensive strategies for public asset and watershed management
- 4) **Smart Growth** - Smart growth and its implications for water related infrastructure development, regional water quality, and regional economy

- 5) **Watershed Protection** - The economic and environmental benefits of source watershed protection strategies and the use of ecological services to meet water supply and quality needs, as opposed to treatment at point of delivery

Following this summary we also include:

- A link to the full versions of final reports, which are available at our website <http://wri.eas.cornell.edu/grants>
- Outreach efforts currently underway
- How we are adapting our efforts in year three to support research and create effective outreach products
- A list of year three projects

For a copy of our year one (2012-2013) summary report, please contact either Brian Rahm (bgr4@cornell.edu) or Sri Vedachalam (sv333@cornell.edu), or go to http://wri.eas.cornell.edu/WRI_Infrastructure_Research_Summary_2013.pdf.

Infrastructure Assessment - Water-related infrastructure including water supply and wastewater treatment facilities, distribution networks, decentralized treatment installations, dams, constructed wetlands, “green” infrastructure, etc., and their current state and effectiveness at providing water services regionally at reasonable cost

Cross-cutting impressions

Previous research suggested there was room for improvement in funding and managing New York State’s “grey” infrastructure systems, such as engineered water treatment facilities and sewer distribution networks, by recognizing how they fit within and impact broader regional and watershed systems. Given limited public funding and increasingly stringent environmental regulation, watershed-scale assessment may yield insight and gains in efficiency not possible using traditional project-level assessments. Decentralized and “green” infrastructure approaches, such as the use of septic systems, vegetated stormwater detention basins, can have benefits when used in the proper way, but can also suffer from lack of rigorous design or maintenance.

Current research supports previous findings related to green infrastructure. Researchers stress that we need better understanding of effective technologies and their environmental benefits and ways to maximize returns on investments. Other work on sewer overflows and the potential for biogas generation and use suggest that many municipalities across the state, particularly smaller ones serving poorer communities or those facing decreasing populations, have capacity to improve their water resource infrastructure. Asset management, perhaps through increased state and federal assistance and incentives, could help these communities achieve higher levels of service.

What researchers found



Photograph of a sampled basin on Cornell University campus

Project Title: **Green infrastructure, water quality, and GHG emissions – year 2**, Todd Walter (Cornell University)

The intent of green infrastructure is to take advantage of natural processes within our built environments to mitigate nonpoint source pollution and reduce impacts of runoff on peak stream discharge. However, there is limited data on green infrastructure effectiveness and the reports that have been published generally consider short time frames and/or are based on single case studies. The goal of this project was to assess the effectiveness of common green infrastructure practices on (1) protecting water quality and (2) reducing greenhouse gas (GHG) emissions. Our 2013 report featured methods testing and preliminary data on the function of green stormwater infrastructure on the Cornell University campus in Ithaca, NY. In this second year, we have used our established methods to gather additional data on greenhouse gas emissions, giving us a sense of variation as a function of season and other environmental conditions. We also captured additional stormwater samples from the detention basins for analysis of pollutant concentrations throughout 2013, and extrapolate this data to infer total pollutant loads trapped by the basins over time. Key findings include:

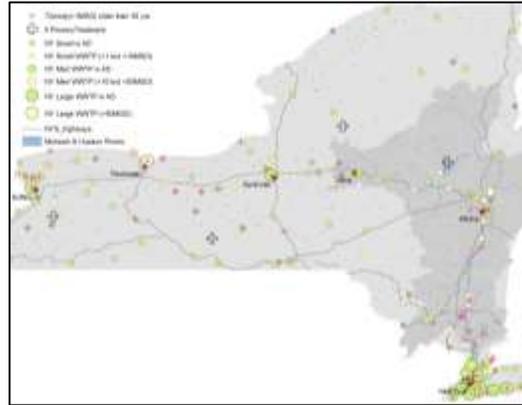
- **Water quality services were variable** across 10 measured stormwater basins, and overall accumulation of pollutants was not strongly correlated to any measured basin characteristic

- **Greenhouse gas (CH₄ and N₂O) emissions were generally low** from 4 measured basins, except for high methane emissions in one with poor drainage and ample soil carbon
- **Continued monitoring is needed** to improve our understanding of ecosystem services and dis-services provided by green infrastructure

Project Title: **Analysis of sewage discharge reports**, Sridhar Vedachalam (Cornell University)

People swim, fish, and play in local creeks and streams. As such, sanitary sewer overflow (SSO) events pose a risk to public health. While the task of reducing SSOs is being undertaken by wastewater utilities, knowledge of such events in the community can be the first line of defense. To increase awareness of SSOs and to minimize their health consequences, New York State passed the Sewage Pollution Right to Know Act in 2012, which requires publicly owned treatment works and sewer systems to report any spills within two hours of discovery to the Department of Environmental Conservation (DEC). The law came into effect on May 1, 2013. We analyzed one year of sewage discharge data reported by wastewater utilities to the DEC. Approximately 87% of the reports were recorded in a single county – Erie. Weather conditions were listed as the primary reason for the SSO event in a large majority of reports. An analysis of discharge reports by month seemed to confirm this observation – the wetter months of June and October recorded higher than normal number of reports. Key findings include:

- **A single county accounted for most reports**, of which a third were reported from a single town
- Aggregation of reports by municipality indicates that **villages are more likely to record overflow events than towns and cities**
- **Older treatment plants serving low-density, low income populations**, were associated with higher number of reports



Project Title: **Current and potential methane production for electricity and heat from NY State wastewater treatment plants**, Peter Woodbury (Cornell University)

What is the potential for increased biogas production and use to provide an economic return for wastewater treatment plants (WWTP) in New York State? To answer this question, we used existing data sets and developed case studies from WWTP throughout the northern USA. Currently, WWTP in New York State use 1.8 million cf CH₄/yr out of a total technical production potential of 3.6 million cf CH₄/yr. We estimate that retrofitting a selected subset of WWTP could increase methane use by 1 million cf CH₄/y. By extrapolating from case studies, we estimated simple financial returns (capital cost divided by annual savings) for three size classes of WWTP. Smaller plants (1-10 MGD) had the greatest simple return (14%), but accounted for only 12% of the total effluent flow. Medium plants (10-50 MGD) had a 4% simple return with 17% of the flow. Large plants (>50 MGD) had a 3% simple return with 72% of the flow. The total cost for retrofitting this selected subset of plants was estimated to be \$572 million. Our analysis is intended as a first step toward investigating options for cost-effective WWTP retrofits to increase biogas production and use and energy efficiency. Key findings include:

- **Retrofits for improved energy capture and use are estimated to cost \$572 million** for the 109 WWTP that are both >1 MGD and have some kind of existing anaerobic digestion infrastructure
- **72 WWTP are excellent priority candidates for retrofitting**, with opportunity to include energy generation and greenhouse mitigation technologies
- All WWTP that have anaerobic infrastructure should be **evaluated for flaring any unused biogas**

Economic vitality - Regional economic vitality with respect to water infrastructure and its effect on private and public investment and industrial development

Cross-cutting impressions

Previous research suggested regional economic vitality is linked to water resources and related infrastructure. Public infrastructure investment creates a foundation upon which commerce and private investment can thrive. Alternatively, poor public water infrastructure and regional coordination can be a barrier to economic growth, and can lead to or exacerbate environmental risks. Because the public does often not see such infrastructure, its value is underestimated. Private and industrial investment in water resource infrastructure is also essential. There is an opportunity to better use, market, and brand Hudson regional water resources to promote water-related businesses, and build on existing water technology industries.

Current research acknowledges the huge increase in industrial activity across the US due to shale oil extraction, but cautions against overestimating the economic benefits likely to be accrued in NY and along rail and water-based shipping routes. Additionally, this activity strains the current capacity of regulators to oversee oil shipment effectively. Environmental risks have the potential to increase liabilities of local and state governments. Scrutiny of industrial facilities is urged during the planning phase, along with a comprehensive risk assessment of rail-based oil transport at the national level.

What researchers found

Project Title: **Planning for expanded industrial activity in and around the Port of Albany**, Dr. Susan Christopherson (Cornell University)

US crude oil production has risen dramatically since 2010. Transporters of oil prefer rail and water modes because of the flexibility they provide as shale plays change productivity, and demand shifts among East,

West, and Southern refiners. Adding to this, Canadian tar sands development is also creating demand for rail and waterway shipping options. Some have reported that monitoring capacity, emergency response, and infrastructure improvements have not risen to meet this new challenge. This research aims to delineate the risks associated with oil shipments through upstate NY and down the Hudson River; assess regional rail infrastructure; and describe the response of local and state officials and environmental agencies. Key findings include:

- The number of crude oil carloads hauled by US railroads is projected to **increase from 10,840 in 2009 to 400,000 in 2014**
- **Existing regulatory policy and capacity may not be sufficient** to address risks to the public, property, and the environment
- Local and state governments might benefit by **calculating potential liabilities, scrutinizing proposed facilities** during the planning board approval process, and **asking the federal government to conduct a comprehensive risk assessment**



Oil tanker railcars

Integrated management - Integration of scientific, economic, planning/governmental and/or social expertise to build comprehensive strategies for public asset and watershed management

Cross-cutting impressions

Previous research suggested that effective management of water resource assets at the municipal level requires appropriate planning, financing, technology, management, maintenance and community buy-in. At the watershed and/or regional scale, water resource management presents a challenge because of various and competing stakeholder perspectives, and low incentives for coordination. That being said, analyses at the watershed scale reveal region-specific characteristics that could help inform water resource management decision-making. Overall, municipal watershed scale planning, asset management, and goal setting may be a way to increase infrastructure system effectiveness and efficiency in the context of diminishing federal funding.

Current research highlights the importance of coordination among regional partners and municipalities, especially when water resources, supplies, and treatment facilities are shared. Planners and decision-makers face serious challenges. The capital-intensive nature of water infrastructure makes it difficult to incorporate changes in the system after initial investment decisions have been made. More complete assessments of water resources are needed at the watershed and regional scale so that stakeholders can come together to find common ground.

What researchers found

Project Title: **A prototype planning support system for managing change in water infrastructure systems in Hudson River and Mohawk River municipalities**, Kieran Donaghy (Cornell University)

Types of Interdependence	Examples from Northeast Orange County Municipalities
<i>Physical Interdependence</i>	Water mains underlie streets and railroads.
<i>Budgetary Interdependence</i>	The scope of transportation improvements and water infrastructure upgrades is constrained by limited capital budgets.
<i>Market Interdependence and Spatial Economic Competition</i>	Smart-growth-oriented urban regeneration in the City of Newburgh competes with ex-urban housing development in the Town of Newburgh and the Town of New Windsor.
<i>Informational Interdependence</i>	For a viable regional water-sharing plan and regional economic development to go forward, multiple stakeholders must share information and craft stable inter-municipal agreements (IMAs).
<i>Environmental Interdependence</i>	The quality of water in Washington Lake is affected by runoff of new exurban housing developments and new access roads.

Types of Interdependence between Critical Infrastructure Systems in Hudson River Communities in Northeast Orange County

We succeeded in developing component models of a prototype planning support system (PSS) for managing change in water infrastructure systems in Hudson watershed municipalities subject to interdependencies with other infrastructure systems, budget constraints, and smart growth principles. We have also succeeded in partnering with a Hudson River municipality to develop and demonstrate the usefulness of the PSS in a test-bed application. The PSS enables users to determine *what* should be done by *whom*, *when*, *where* and by *how much* in order to implement water infrastructure repairs and upgrades in Northeast Orange County (NEOC) that are consistent with transportation and land-use plans promoting smart growth. It also indicates what the economic impacts of the capital investments in NEOC would likely be, based on differing assumptions about the level of expenditures, their source, and how they are financed. The PSS can be used by stakeholders to explore contingent paths between interdependent decisions and identify a feasible set of alternative inter-municipal agreements (IMAs). Key outcomes include:

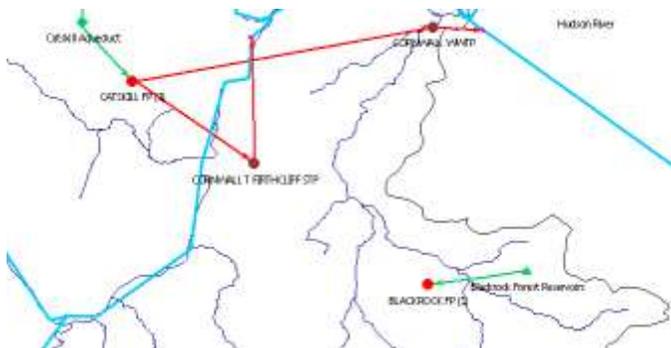
- We demonstrated it is possible to **examine implications of alternative water and transportation infrastructure repairs and upgrades** over multiple periods from a comprehensive regional planning perspective
- Models suggest it will be **difficult to implement all changes elaborated by existing plans without alternative financial arrangements** and stable, mutually acceptable IMAs

- Infrastructure investments appear to favor higher-income households, indicating that **distributional impacts should be explicitly considered in planning infrastructural changes**

Project Title: **Using the Water Evaluation and Planning (WEAP) tool for the Moodna Watershed**, Brian Rahm (Cornell University)

The quantity, quality and movement of water through municipal infrastructure, from a supply point to discharge, can have an impact on local ecosystems and economies. Here, we seek to understand and map the withdrawal, transfer, and return of municipal water throughout the Moodna Watershed in Orange County. Local stakeholders in the Moodna are concerned that water systems and the surface waterways that feed them are being stressed by increased development and increasing interbasin transfer as communities in surrounding watersheds grow simultaneously. This study utilizes a modeling tool called Water Evaluation & Planning (WEAP). We collected and mapped water supply withdrawals throughout the watershed, and made preliminary assessments of streamflow health now and under a variety of possible future development scenarios. Key findings include:

- We **quantify and map several interbasin transfers** of water from the Moodna to surrounding watersheds
- Determining local impacts of withdrawals associated with particular municipalities will **require more detailed modeling at sub-watershed-scale**
- Future research should better incorporate groundwater data such as **well yield and recharge rates**



Partial WEAP schematic of Cornwall's water system

Smart growth - Smart growth and its implications for water related infrastructure development, regional water quality, and regional economy

Cross-cutting impressions

Previous research suggested that smart growth principles can help guide water resource management activities and investment in more effective and efficient ways, although it is not always clear how such principles should be applied, particularly in rural regions, or in urban areas losing population. Recent efforts by NY State are successfully promoting smart growth related to water infrastructure. However, gains in economic efficiency or quality of life still rely greatly on the degree to which local municipalities and decision-makers buy into system planning goals. Overall, local conditions remain extremely important in shaping smart growth planning and its success.

Current research on the role of economies of scale in water supply utilities also highlights the importance of local conditions when trying to determine whether some infrastructure investments make sense. Both economies of scale and smart growth will vary according to a particular situation. Further research on smart growth confirms that it is becoming more widely recognized, and that integration of new policy requirements in the Consolidated Funding Application process are helping to normalize awareness of smart growth principles. However, its impact on actual expenditures remains unclear.

What researchers found

Project Title: **Hudson water and sewer smart growth infrastructure**, David Kay (Cornell University)

The major state agencies that are responsible for funding of the state's water and wastewater infrastructure projects seem to have made significant progress towards integrating the provisions of the NYS Smart Growth Public Infrastructure Policy Act (SGPIPA) into their project and funding review protocols. One of the goals of this work was to examine more closely the extent to which actual expenditures of state funding

agencies went to projects that are consistent with the ten smart growth principles articulated in SGPIPA. Since SGPIPA's smart growth goals do not override agency priorities or mandates it is still unclear whether and how project funding will change when priorities, mandates, and smart growth are in tension. It was also our goal to assess the degree to which municipal leaders were familiar with SGPIPA, and whether or not various stakeholders viewed the law as significant and relevant to their municipalities approach to financing. Key findings include:

- 41% of the state's cities, towns and villages were **aware of the existence of the law**, but none claimed to be "very familiar"
- **Integration of SGPIPA into the Consolidated Funding Application process** will aid in familiarizing more local officials and influence state agency decision making



(Image credit: Marc Szarkowski and SimCity)

Project Title: **How small is too small? Scale economies in water utilities**, R Richard Geddes (Cornell University)

New York State faces a pressing challenge due to aging and inadequate drinking water infrastructure, such as pumps, plants, and pipes. Public resources to address this issue are limited. To be effective, water policy must consider the key concept of economies of scale, which suggests that unit cost of production drops with increasing firm size. We estimate scale economies in U.S. water infrastructure by examining the effect of firm size on the price per gallon, which we take as a proxy for unit cost. We collected data on U.S. water systems for the years 2004, 2006, 2008, 2010, and 2012 to produce 1,371 unique firm-level observations.

Preliminary estimates using this large data set indicate that there are substantial economies of scale in U.S. water utilities. However, the scale effect is not seen in a similar analysis of Northeast utilities – the closest approximation for NY utilities. Detection of outliers and the inclusion of additional city-specific controls will strengthen these results, and yield policy-relevant conclusions. Key findings include:

- Understanding economies of scale in water, i.e. how cost varies with the size of the firm, is **critical for using scarce public resources wisely**
- Preliminary estimates indicate **substantial economies of scale in U.S. water utilities**
- Unlike utilities at a national scale, **Northeastern utilities do not display economies of scale**

Watershed protection - The economic and environmental benefits of source watershed protection strategies and the use of ecological services to meet water supply and quality needs, as opposed to treatment at point of delivery

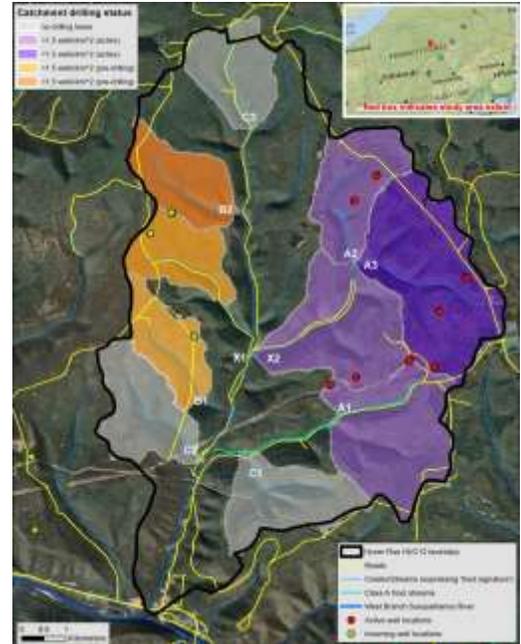
Cross-cutting impressions

Previous research suggested an urgent need to characterize the economic and environmental costs and benefits of ecosystem services provided by source watershed protection, particularly in areas where grey infrastructure is aging and funding is limited. While the New York City watershed management program serves as an example of how source water protection can viably meet water supply quality goals without extensive water treatment, less is known about how municipalities with fewer resources can also leverage benefits from this approach. Additionally, there is a need to better understand economic and environmental implications of water withdrawals at the watershed level, particularly now that NY has passed legislation regarding water withdrawal permitting.

Current research continues to highlight the importance of protecting our watersheds, and also suggests that conventional wisdom is not always correct in terms of what factors may be most important in keeping our watersheds healthy. Specifically, forest lands, while having many benefits, may not always enhance flood control the way we think, while other aspects of the watershed may play a larger role in some areas. Water resources managers and planners will have to continue to explore and balance the costs and benefits of various development scenarios if we want our understanding of watershed protection to be robust.

What researchers found

Project Title: **Impacts of hydraulic fracturing infrastructure development on valued fish (brook trout) habitat**, Maya Weltman-Fahs (Cornell University)



Study area map depicting key elements and sampling locations

Eastern brook trout are native to the eastern United States and a good indicator species of anthropogenic disturbance in streams because they require clean cold water, intact habitat, and strong supporting food webs to maintain healthy populations. Brook trout have been reduced or extirpated across much of their native range, primarily because of anthropogenic land and water alterations, which have resulted in habitat reduction and fragmentation, water quality and temperature changes, and modification of the biological environment through introduction of other species. This declining species faces further pressure from rapidly expanding natural gas extraction activity in the Marcellus Shale region, which overlaps twenty-six percent of the historical distribution of brook trout habitat. The objective of this study is twofold: (1) to observe the effects of infrastructure development for well pads, roads and pipelines on brook trout habitat and populations under the existing regime of shale gas activities in Pennsylvania and (2) to build a model for prediction of shale gas infrastructure locations and impacts in New York State. Key findings include:

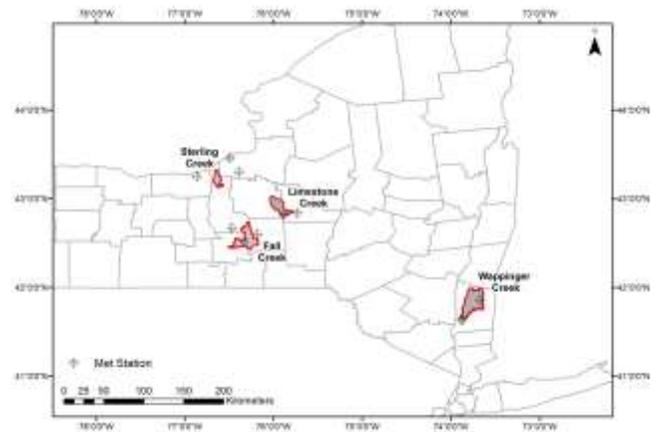
- Initial data processing shows **significant differences in brook trout sizes (length and weight) across three drilling treatments** (Active Drilling; Pre-drilling Land Clearing; Control)

- **Plan to examine possible correlations between observed fish sizes and environmental conditions** using field-collected data (including water chemistry and macroinvertebrate community structures)
- **Third field collection year currently underway**, with seasonal collections for spring-summer-fall

Project Title: **Digitizing a 70-year record of land use change in New York State watersheds to examine the effectiveness of non-structural landscape modification on flood control**, Stephen Shaw (SUNY ESF)

In humid, temperate regions, there remains limited direct evidence of the influence of land cover changes on hydrologic response (e.g. peak discharge), especially across larger watersheds. Using historic aerial photography in conjunction with long-term stream gaging data, we assessed the role of land cover change on hydrologic response over multi-decadal periods in four watersheds in New York State. All four watersheds had increases in forest cover accompanied by small increases in urban land cover. Hydrologic response was evaluated by considering precipitation, watershed wetness, and discharge for each era of distinct land cover. One watershed (Limestone Creek) exhibited virtually no change in hydrologic response despite forest cover increasing by over 100%. One watershed (Fall Creek) exhibited a slight increase in hydrologic response with a greater than 100% increase in forest cover. Key findings include:

- **Increasing forested land does not always reduce peak discharge** and, often, other factors may be more important than basic land cover in controlling hydrologic response
- **Construction of dams, and loss of riparian wetlands, also may play large roles** on hydrologic response



Location of study watersheds and meteorological stations within New York State

Full versions of final reports are available at our website

<http://wri.eas.cornell.edu/grants>

Outreach – How have we been communicating results of our work?

For a complete listing of outreach activities performed by WRI and HREP staff, please see our website at <http://wri.eas.cornell.edu/activities>

For information on outreach activities performed by faculty researchers at Cornell and elsewhere, please see individual project reports posted at <http://wri.eas.cornell.edu/grants>

Year Three (2014-2015) - How we are adapting our efforts to support research and create effective outreach products?

The second year of this coordinated effort launched a number of new analyses and continued several others. New investigators were invited to strengthen our ability to conduct interdisciplinary work. In years two and three, all researchers were encouraged to consider partnering with each other, a municipality, state agency, or other research institution, and we feel this current report reflects our initial success in this regard. We now endeavor to give reports and outreach materials a similar look and feel. Furthermore, several researchers, including WRI staff, have contributed to publication series distributed by the Community and Regional Development Institute (CaRDI) at Cornell University in order to better reach policy-makers, planners, and municipal officials with whom CaRDI has strong ties. In year three we are also re-focusing on the Hudson estuary and river corridor – see Coordinated Projects below – and hope to have outreach materials of interest to estuary stakeholders. As we have in previous years, WRI will continue to encourage collaborative, multi-disciplinary projects as a way to provide holistic assessment of issues related to water resource infrastructure, and its effect on ecology, environment, people and the economy.

Year Three (2014-2015) – Funded projects for year three

Funded projects fall within two administrative categories. **Competitive** research involves investigators from institutions across the state who responded to a formal request for proposals. These researchers will work largely independently, but can be contacted and consulted regarding opportunities for cooperation and outreach. **Coordinated** research involves Cornell faculty who have agreed to meet quarterly to facilitate discussion and synergy among individuals, as well as with staff from WRI, HREP and the Mohawk River Basin Program (MRBP).

Competitive Projects

Project Title: **Watershed-Scale Evaluation of Stormwater Management Practices Through Geospatial, Field, and Modeling Analyses** (Katherine Meierdiercks – Siena College)

Project Title: **Integrating green infrastructure into the land use regulatory process through the City of Newburgh Conservation Advisory Council** (Jeffrey LeJava – Pace Land Use Law Center)

Coordinated Projects

Project Title: **Potential and feasibility of green infrastructure in Upstate NY** (Daniel Ohrenstein-Cornell University; City & Regional Planning)

Project Title: **Computerized content analysis of online reviews of water-centric entertainment areas** (Srinagesh Gavirneni - Cornell University; Johnson School of Management)

Project Title: **NY State and smart growth: Policy triangulation, coherence, tensions** (David Kay - Cornell University; Development Sociology)

Coordinated Projects (continued)

Project Title: **Innovative approaches to making a business case for water resource management** (Mark Milstein - Cornell University)

Project Title: **Septic systems and GHG emissions** (Todd Walter - Cornell University; Biological & Environmental Engineering)

Project Title: **The themes surrounding the Hudson River: A content analysis of newspapers along the Hudson** (Clifford Scherer - Cornell University; Communication)

Project Title: **Further development and application of a planning support system for managing change in water infrastructure systems in Hudson River municipalities** (Kieran Donaghy - Cornell University; City & Regional Planning)

Project Title: **Roadside ditches: Source or filter of greenhouse gases?** (Rebecca Schneider - Cornell University; Natural Resources)

Project Title: **Visualizing Landscape Change: Social space and CSO's in the Hudson River Watershed** (Brian Davis - Cornell University; Landscape Architecture)

In addition to the projects listed above, WRI staff and interns, in cooperation with Hudson River Estuary Program and Mohawk River Basin Program staff will conduct research related to infrastructure effectiveness, economic vitality, integrated management, smart growth, and watershed protection. For more information on these efforts please contact either Brian Rahm (bgr4@cornell.edu) or Sri Vedachalam (sv333@cornell.edu).

For information on the HREP and MRBP Action Agendas please see:

HREP - http://www.dec.ny.gov/docs/remediation_hudson_pdf/hreaa2010.pdf

MRBP - http://www.dec.ny.gov/docs/water_pdf/mohawkactagenda.pdf

BLUEPRINT FOR MODERNIZING BUILT ENVIRONMENT LAW: A VIEW FROM THE BUDGET

*Terri Matthews**

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INTRODUCTION

New York's mid-20th century ensemble of public construction laws constrains the vast majority of its public owners with 21st century capital programs. Were New York to modernize its laws—in particular its public construction procurement laws for all public owners—to reflect modern service delivery methodologies and to permit flexibility where little to none exists, it would help eliminate one cause of avoidable costs attributable to the mismatch of service delivery methodology and project needs.¹

In New York, the civic conversation related to public capital programs has lately included: the need for the “public private partnership[],” the notion of our crumbling infrastructure, and the strategy of increasing investment in infrastructure to support increased economic activity.² On the legislative front, recent reform has consisted of adjusting, in 2008, the mandatory multiple prime contract requirement in a limited way to narrowly reflect some 21st century issues, and authorizing, in 2011, the use of the design-build methodology for a limited number of public owners on limited types of horizontal infrastructure due to the need to perform emergency roadwork necessitated by Tropical Storm Irene, and to build a replacement for the Tappan Zee Bridge.³

This article attempts to explain various aspects that, in the aggregate, contribute to a “disconnect” between the rhetoric of reform and current legislation. The fact remains that the State's organic set of laws under which public capital programs at all levels of government in the State are conceived, financed, constructed and maintained during and beyond their useful lives, are not only archaic, but have steadfastly resisted modernization. In order to provide the conceptual resources for more effective

¹ The articulation of this proposition comes from the work of the New York City Bar Association's Construction Law Committee, in which this author participated. Many aspects of this article are based on the following reports, of which this author is also the primary author: CONSTR. LAW COMM., N.Y.C. BAR ASS'N, 21ST CENTURY CONSTRUCTION: 20TH CENTURY CONSTRUCTION LAW: *UPDATE* 12 (2011) [hereinafter CONSTR. LAW COMM. (2011)]; CONSTR. LAW COMM., ASS'N OF THE BAR OF THE CITY OF N.Y., 21ST CENTURY CONSTRUCTION: 20TH CENTURY CONSTRUCTION LAW 2 (2008) [hereinafter CONSTR. LAW COMM. (2008)].

² CONSTR. LAW COMM. (2011), *supra* note 1, at 7.

³ S. 6806, 2007 Leg., 231st Sess. (N.Y. 2008); S. 50002, 2011 Gen. Assemb., Extraordinary Sess. (N.Y. 2011).

advocacy by others, this article performs a multi-disciplinary analysis of a statutory ensemble that affects all aspects of the State's built environment.⁴ Laws affecting intertwined public and private sector activities, such as those involved in public sector construction, are the result of practices and theories (some economic) that change over time after the laws were enacted. To understand the impact of the laws as they are at any given time requires a multi-disciplinary approach.

A blueprint of this article follows. It begins with a brief review of some recent academic literature about public-private partnerships, and moves into a historical analysis of New York State public finance and construction laws, considering them together, since they both support public capital programs. This article synthesizes ideas from several different perspectives: the Model Code of Public Infrastructure Procurement, a conceptual framework of capital project finance and delivery developed at Massachusetts Institute of Technology (MIT), the history of multi-disciplinary optimization in allied areas of manufacturing. It then identifies functional aspects of the design-build methodology, such as closer and earlier collaboration between designer and constructor on a project, and the ability to focus on the life cycle costs of the asset, that, along with the quantitative analyses identified in the course of research (most of which are from engineering disciplines) permit a crosswalk to the intertwined capital and expense budget process.

Finance and budgeting are isolated and esoteric academic and practice areas that prove difficult to link to discussions of non-budget practice, theory, and law. This volume of the *Albany Government Law Review*, entitled "Public Budgets: Planning Our Financial Future," permits the description of an exercise in linking to public budgeting a complex social system that is directly affected by statutory content. At the end of this article there is a conceptual roadmap (or to continue the metaphor, a shop drawing) that leads the reader through the fiscal impact methodology of calculating avoidable costs occasioned by

⁴ Throughout this article, references to the State encompasses various entities, including state-level and local government-level authorities at all levels of government within the State, which have a role in the built environment. Local governments and authorities are creatures of state legislation who, in the case of public capital programs, are all significantly constrained by a number of State laws of general application. The use of the term "public owner" is another such term intended to cover these constrained entities.

modernizing public construction procurement law, in particular by expanding to all public owners the ability to use the design-build service delivery methodology when, based on the combination of project and project team characteristics, it is the optimum methodology for a particular project.

I. BRIEF LITERATURE SURVEY

The academic literature generated by recent interest in “public-private partnership[s]”⁵ highlights several interesting issues related to American history, tax policy and law, as well as economic theories of fairly recent vintage. When the public-private partnership, itself a polysemous concept, is placed in the context of American history, it stands for the proposition that “everything new is old again.”⁶ When the public-private partnership is placed in a contemporary global context it reveals not only a grafting of a European model on American public built environment law,⁷ but also the extraordinary level of fragmentation of such law that is reflected in the equally fragmented construction industry and allied academic fields.⁸

Moreover, when completed, public-private partnership projects are viewed in the context of the systems of which they are a part.

⁵ Dominique Custos & John Reitz, *Public-Private Partnerships*, 58 AM J. COMP. L. 555 (2010).

⁶ *Id.* at 556, 567; see also John B. Miller, *Life Cycle Delivery of Public Infrastructure: Precedents and Opportunities for the Commonwealth* 7 (Pioneer Inst. Pub. Policy Research, White Paper No. 44, 2008) (outlining the history of public-private partnerships and writing that “[t]here is no project delivery method that is uniquely and consistently best for the delivery of all of America’s infrastructure projects.”).

⁷ Custos & Reitz, *supra* note 5, at 561.

⁸ *Id.* at 557; see Patrick Bajari, Robert McMillan & Steven Tadelis, *Auctions Versus Negotiations in Procurement: An Empirical Analysis*, 25 J. L. ECON. & ORG. 372, 384 (2009) (regarding the highly spatial nature of the construction industry); see also JOHN FAIRCLOUGH, DEP’T OF TRADE & INDUS., RETHINKING CONSTRUCTION INNOVATION AND RESEARCH: A REVIEW OF GOVERNMENT R&D POLICIES AND PRACTICES 14 (2002) (discussing that the fragmented nature of the construction industry makes the construction industry reliant on government); DANNY MYERS, CONSTRUCTION ECONOMICS: A NEW APPROACH 6–7, 10 (2004) (discussing the “highly fragmented” construction industry, resulting in a lack of a “coherent conceptual consensus about what constitutes the precise nature of construction economics.”); Joel R. Oaña, Developing and Managing a Research Program: FEU-SURE and Urbanization Issues 1, 2 (Nov. 19, 2004), available at http://ched-zrc.dlsu.edu.ph/pdfs/joel_oana_paper.pdf (discussing the various research strategies that may be utilized in architecture and urban research (citing LINDA N. GROAT & DAVID WANG, ARCHITECTURAL RESEARCH METHODS 7, 14, 16–18 (2002))).

They operate to fragment those infrastructure systems, which have been thought to exert significant economic benefits at the national level as well as within component economic spheres.⁹ In addition, when one federal agency alone supports public-private partnerships in its national grant policies in a manner that is at odds with tax expenditure policy implicit in the federal tax code for state and local government debt, such federal policy fragmentation can do little to help resolve any of the issues raised.¹⁰

When the public-private partnership is placed in the context of legal analysis, it raises significant governance issues. Contemporary public-private partnerships represent the public use of private contract law to make “binding intertemporal precommitments”¹¹ that, with varying degrees of success or “perpetual[] . . . breach,”¹² attempt to loosen historical public law prohibitions that have limited the ability of one set of governmental actors to bind their successors (also known as “entrenchment”) raising governance concerns.¹³ These public laws were enacted across the country primarily during the late nineteenth century to guard against the types of actual exuberant public-private transactions that proved unwise.¹⁴

These transactions that attempt to increase “entrenchment” among public contracting, property, finance, and built environment aspects,¹⁵ have arrived at a time when American

⁹ Ellen Dannin, *Crumbling Infrastructure, Crumbling Democracy: Infrastructure Privatization Contracts and Their Effects on State and Local Governance*, 6 NW. J. L. & SOC. POL'Y 47, 62–64, 82–83 (2011).

¹⁰ *Id.* at 68–69; Custos & Reitz, *supra* note 5, at 562–63 (discussing the incentives the Federal Highway Administration granted in establishing PPPs).

¹¹ Binding intertemporal precommitments, conceptually, are commitments established in some legislative act by one legislative body that limit in some way the freedom of subsequent legislatures to act with respect to matter covered. See Christopher Serkin, *Public Entrenchment through Private Law: Binding Local Governments*, 78 U. CHI. L. REV. 879, 881, 887, 889 (2011) (arguing that unrepealable government legislation restricts the effectiveness of subsequent legislatures).

¹² Dannin, *supra* note 9, at 65; see also Klaus M. Schmidt, *The Costs and Benefits of Privatization: An Incomplete Contracts Approach*, 12 J.L. ECON. & ORG. 1, 2–4 (1996) (discussing the benefits of privatization versus nationalization).

¹³ Serkin, *supra* note 11, at 881–87.

¹⁴ *Id.* at 906–07, 925–26; see also Custos & Reitz, *supra* note 5, at 567–69, 582–83 (discussing how “reference to the past is . . . meant to legitim[ize] modern PPPs.”).

¹⁵ See Serkin, *supra* note 11, at 887–88, 890, 892–915; see also Custos & Reitz, *supra* note 5, at 575–76.

government perceives itself, and is perceived by citizens and taxpayers, as being unable to cope with its “crumbling infrastructure.”¹⁶ In addition to the general trend of loosening safeguards,¹⁷ elements of modern public-private partnerships deemed necessary—such as compensation events, non-competition provisions, and limits related to adverse action—also tend to limit the ability of the contracting government entity to act as a representative and democratic governmental entity during the term of the transaction.¹⁸

Finally, when the public-private partnership is placed in the context of economic analytical models, it can provide helpful insights into the relative economic efficiencies that “organizational innovation” can impart “to the delivery of public services” at a time when “governments around the world struggle to provide more and better services to their citizens on limited budgets[.]”¹⁹

After deconstructing the life of a capital project into a simple framework consisting of four elements—from project definition/design to operation and maintenance—that can be performed by any combination of public and private sector actors,²⁰ it then becomes possible to apply recent economic theory focusing on relationship-specific assets and their related incomplete contracts in order to assess the relative economic efficiencies of particular organizational structures to deliver and operate capital projects.²¹ Conceptually analyzing the various elements and organizational structures in this manner, identifying “[c]omplementarities [a]cross [t]asks,” and pausing for a moment on the issue of government’s loss of control²² can reveal some helpful insights into relative efficiencies.²³ This, most importantly, requires future “independent research to determine

¹⁶ Dannin, *supra* note 9, at 50.

¹⁷ Serkin, *supra* note 11, at 881–82, 929–31.

¹⁸ Dannin, *supra* note 9, at 54–73.

¹⁹ Jean-Etienne de Bettignies & Thomas W. Ross, *The Economics of Public-Private Partnerships*, 30 CAN. PUB. POL’Y 135, 135 (2004).

²⁰ *Id.* at 137; *see also* Custos & Reitz, *supra* note 5, at 557 n.9; Miller, *supra* note 6, at 20–30.

²¹ de Bettignies & Ross, *supra* note 19, at 140 (citing the work of Coase, Williamson, Klein, Crawford, and Alchian); Miller, *supra* note 6, at 31.

²² de Bettignies & Ross, *supra* note 19, at 143–45.

²³ *Id.* at 148–49. For a discussion on the role of government in providing greater allocative efficiencies to society in contrast to the private sector’s provision of greater production efficiencies, *see id.* at 142.

the true benefits and costs of public-private partnerships.”²⁴

This brief survey of the academic literature, spanning several academic disciplines, underscores the complexity of the public-private partnership model and the complex nature of the problems it is intended to solve, as well as its unintended negative consequences. We need to rely on a multi-disciplinary, “it takes a village” approach to go from public construction law to the budget. The next multi-disciplinary pairing involves law and history in order to expose the historical roots of the bifurcation of two sets of law that have always operated in tandem on public capital programs in fact, if not in practice.

II. HARD DIVIDE IN NEW YORK BETWEEN PUBLIC CONSTRUCTION AND PUBLIC FINANCE

The “public-private partnership” conversation reveals a divide between public finance law and public construction law that goes beyond the different titles in the McKinney volumes and the use of terms such as “public works” and “public improvement.” Public finance laws and public construction laws responded to different historical concerns, and evolved differently over time, though both are integral to public capital programs. Modern capital programs require a set of integrated finance and construction laws for the most efficient and effective use of resources.²⁵ The statutory foundation for state level and local government level public projects, however, remains as fractured as it was when it was established.²⁶ Arguably, these laws reflect simpler built environment artifacts that required simpler techniques and tools. These outdated laws, however, limit the ability of public sector owners to avoid costs with modern service delivery techniques and tools, some of which are also financing techniques and tools.²⁷

New York State’s creation of authorities to finance state and local government public projects in the [20th] century . . . was . . . a rational response to . . . [insufficient levels of] direct federal [participation] in public infrastructure, constitutional debt limits imposed by the State Constitution on both the State and its local governments, and a general attempt to avoid negative

²⁴ *Id.* at 149; *see also* Serkin, *supra* note 11, at 934, 936–38 (discussing the costs and benefits of PPPs).

²⁵ *See* de Bettignies & Ross, *supra* note 19, at 138–43; *see also* CONSTR. LAW COMM. (2008), *supra* note 1, at 4.

²⁶ *See generally* Oaña, *supra* note 8.

²⁷ *See* CONSTR. LAW COMM. (2011), *supra* note 1, at 12–13, 16.

consequences flowing from the external and internal (bureaucratic) politics of public works.²⁸

Creation of these authorities to finance and/or construct their respective public works was the result of “a strategy of circumvention that has tempered the need to attack anachronistic state restrictions directly.”²⁹ “The [New York] State Constitution of 1938 expanded the State’s public welfare, medical care, and housing obligations, while making ‘no effort to reform the 19th century restrictions on state and local debt’”³⁰ The Constitution “requires a referendum for the State to issue ‘indebtedness[,]’” and it places a formula-based limit on the total amount of outstanding indebtedness at the local government level.³¹ Similar constitutional constraints across the country, resulting from 19th century railroad bond defaults, led to the eventual creation and acceptance of authorities as necessary means to necessary ends.³²

By the end of the first half of the last century, New York enacted the significant elements of the public construction procurement statutory ensemble, which, with tinkering on the margins, remains essentially the same reflection of theory and practice today as when it was enacted.³³ This early-to-mid-century ensemble reflects the dominant method of delivering construction projects at that time—design-bid-build—as did the statutes of most other states during this period.³⁴ While a word search of McKinney’s for “design-bid-build” will yield no statutory reference, this functional term describes the state’s authorized methodology for the vast majority of its public owners.³⁵

²⁸ *Id.* at 5; see also ALBERTA M. SBRAGIA, *DEBT WISH: ENTREPRENEURIAL CITIES, U.S. FEDERALISM, AND ECONOMIC DEVELOPMENT* 22–23 (1996) (explaining the subordinate role the federal government played in public investment during the nineteenth century).

²⁹ SBRAGIA, *supra* note 28, at 216.

³⁰ CONSTR. LAW COMM. (2011), *supra* note 1, at 5 (quoting Kenneth Bond, *Conduit Financing: A Primer and Look Around the Corner*, 11 N.Y. ST. B. ASS’N GOV’T L. & POL’Y J. 68, 73 (2009) (examples of anti-entrenchment provisions)).

³¹ CONSTR. LAW COMM. (2011), *supra* note 1, at 5–6.

³² See SBRAGIA, *supra* note 28, at 22–23 (giving an excellent analysis that accurately portrays the history of American public finance).

³³ See CONSTR. LAW COMM. (2011), *supra* note 1, at 6.

³⁴ *Id.*

³⁵ CONSTR. LAW COMM., ASS’N OF THE BAR OF THE CITY OF N.Y., *REPORT ON ALTERNATE METHODS OF PUBLIC WORKS PROCUREMENT* 8 (2003).

Table One

<i>Mandatory Separation of Designer and Constructor +</i>	<i>Mandated Award to Proposer with Lowest Initial Price</i>
= Mandated Public Design-Bid-Build Methodology	
Public owner must prepare separate <i>specifications</i> for three articulated subdivisions of work, <i>which specifications shall be drawn as to permit bidding.</i> (GML § 101 (1) and (2); SFL § 135); <i>see also Ed. Law §§7302, 7202, 7209(4), 7210</i> ³⁶	Public owners must award contracts for public work to lowest responsible bidder. (GML § 103 (1); SFL § 135) ³⁷
Designer's job is to create "final and complete" drawings and specifications, in absence of information from constructor, that owner puts out to public bid by constructors—mechanics of law mandates separation of designer (architect/engineer) from constructor (a cast of prime- and sub-contractors and trades) at earliest stages of design when changes to design are less costly, relative to changes during construction phase. ³⁸ Increasing technological complexity of built things tests	Mandatory focus of law on price alone assumes built item is a commodity, which, in many instances, it is not; it also implies that constructor does not exercise skill or judgment like project participants licensed under Education Law.

³⁶ Robert J. MacPherson et al., *New York Construction Law*, in STATE PUBLIC CONSTRUCTION LAW SOURCE BOOK 8 (Michael K. Love & Douglas L. Patin eds., 2002).

³⁷ New York State also mandates multiple prime contracting, a construction innovation at one time, which requires a strong owner to use it effectively. Each multiple prime contractor has contract privity with the owner and not with each other or with the general contractor. To the extent an owner is not institutionally equipped to manage multiple prime contracts and/or a project is not suitable for multiple prime contracts, this mandated feature of New York construction law creates additional avoidable costs, which are not covered by the analysis of this article.

³⁸ CONSTR. LAW COMM. (2011), *supra* note 1, at 6, 10.

reality of legal requirement of “final and complete.”	
Project team cannot avoid certain costs during construction that are directly related to separation of designer and constructor and inevitable later revelation of information on the site during construction, which, if able to have been revealed during design phase, could have been avoided.	Mandatory focus on initial construction price instead of life cycle costs/best value <i>exacerbates</i> public sector’s tendency not to focus on operation and maintenance costs in annual expense budget and also to engage in deferred maintenance, leading to higher capital costs in long-term.

While the public design-bid-build methodology reflected appropriate practice at one time for the vast majority of public and private construction projects, it is now “embedded in a series of laws that were enacted, or were perceived to have been enacted, in response to earlier instances of corruption in public works.”³⁹ “In particular, this [methodology] reflects a strong bias against negotiation as a way to obtain the best value for construction services and products,” in spite of evidence to the contrary of a relationship between lowest initial price and quality or lowest life-cycle costs.⁴⁰ While history has perpetuated a bifurcation of inter-dependent and related functions that obscures the cost of maintaining the *status quo* ensemble, the recent introduction of the public-private partnership into the civic landscape can help clarify matters.

III. PUBLIC-PRIVATE PARTNERSHIP’S ELIMINATION OF HARD DIVIDE HIGHLIGHTS MAKES WHOLE PICTURE CLEARER

The public-private partnership recently advocated has been of the form imported from highly centralized European countries, which do not have our federated tax system with a tax-exempt

³⁹ CONSTR. LAW COMM. (2011), *supra* note 1, at 6; AM. INST. OF ARCHITECTS N.Y. STATE, INC. & N.Y.C. BAR, BUILDING IN THE 21ST CENTURY: PUBLIC CONSTRUCTION LAW REFORM AND OPPORTUNITIES FOR SAVINGS, RECORD OF PROCEEDINGS 4 (2008) [hereinafter BUILDING IN THE 21ST CENTURY].

⁴⁰ CONSTR. LAW COMM. (2011), *supra* note 1, at 6; BUILDING IN THE 21ST CENTURY, *supra* note 39, at 4.

finance feature.⁴¹ This imported form seamlessly blends two conceptual constructs—finance and procurement—that in the United States are two separate legal constructs, each with its own set of constraints in New York.⁴² The finance constraint is primarily imposed by federal tax law.⁴³ The United States takes advantage of its tax structure to target tax exemptions to subsidize certain public goods.⁴⁴ The exemption from federal taxation of interest on state and local government bonds is deemed a tax expenditure that subsidizes state and local government capital construction projects.⁴⁵ The federal tax code determines the maximum level of private sector involvement that it will permit and still grant the benefit of this federal tax expenditure.⁴⁶ New York State and its local governments have, for years, successfully utilized this federal subsidization program.⁴⁷ Apart from confusion generated by the mixed signals that emanate from disparate federal policies,⁴⁸ the federal tax code permits tax exemption of interest on debt used to finance public capital projects.⁴⁹ But for the arbitrary restriction in New York on most public owners' ability to use service delivery

⁴¹ CONSTR. LAW COMM. (2011), *supra* note 1, at 8.

⁴² See generally STATE PROCUREMENT COUNCIL, NEW YORK STATE PROCUREMENT GUIDELINES 4–17 (2009) (discussing the requirements and standards New York State agencies must follow in the purchase of commodities, services, and technology).

⁴³ OFFICE OF THE N.Y. STATE COMPTROLLER, DIV. OF LOCAL GOV'T & SCH. ACCOUNTABILITY, FINANCIAL CONDITION ANALYSIS 3, <http://www.osc.state.ny.us/localgov/pubs/lmgmg/financialconditionanalysis.pdf>.

⁴⁴ RICHARD A. MUSGRAVE & PEGGY B. MUSGRAVE, PUBLIC FINANCE IN THEORY AND PRACTICE 335–36, 365, 562 (5th ed. 1989); see also MYERS, *supra* note 8, at 150–55.

⁴⁵ 26 U.S.C. §§ 141, 142, 144, 150 (2006) (outlining which bonds qualify for tax exempt status); see Jerome Kurtz, *The Interest Deduction Under Our Hybrid Tax System: Muddling Toward Accommodation*, 50 TAX L. REV. 153, 195–96 (1995) (discussing how state and local bonds subsidize public construction projects, because tax exempt bonds serve “as a form of revenue sharing [which is] a way for the federal government to assist state and local governments”).

⁴⁶ 26 U.S.C. § 144.

⁴⁷ See *Mission*, N.Y. MUN. BOND BANK AGENCY, <http://www.nyshcr.org/Agencies/MBBA/> (last updated Jan. 26, 2011) (explaining the history of the offering of municipal bonds in New York State). The purpose of the State of New York Municipal Bond Bank Agency is to issue bonds, the proceeds of which are used by local governments to finance public works. *Id.*

⁴⁸ See Dannin, *supra* note 9, at 63–67 (arguing that the public works subsidized by tax exempt state and local bonds promote activity that contradicts other federal policy goals).

⁴⁹ 26 U.S.C. § 103 (2006) (exempting interest on any state or local bond from gross income).

methodologies other than design-bid-build, most value for money analysis for projects financeable with tax-exempt bonds should demonstrate the cost efficiency of public projects, owned by the public, financed with public debt.⁵⁰

The civic conversations about the benefits of public-private partnerships imply or assume “that the private sector is more efficient and effective than the public sector.”⁵¹ In New York, one significant reason for public owners not producing construction performance results similar to those attributed to the private sector is that State law denies public owners access to the same service delivery methodologies that private sector owners have been using for years, specifically the design-build methodology that permits production efficiencies in a number of ways, including the collaboration between designer and constructor early in the design process.⁵² Since the “value for money” concept—“an economic appraisal that compares the economic costs and benefits of alternative investment decisions”⁵³—is both a justification and an evaluation tool for public private partnership transactions,⁵⁴ it is critical that New York law permit a comparative analysis that is both valid and fair to all combinations of public and private sector actors in any number of bundling options for project tasks and functions.⁵⁵ In the absence of access to the design-build methodology, New York public owners will find analyses of public private-partnerships, in particular the “value for money assessment[,] skewed in favour of

⁵⁰ See Allyson M. Pollock et al., *Private Finance and “Value for Money” in NHS Hospitals: A Policy in Search of a Rationale?*, 324 BRIT. MED. J. 1205, 1205–08 (2002) (analyzing the value for money metric and discussing how the purported benefits from public private partnerships in addition to value for money—increased private investment without increasing public indebtedness and increased service levels without adversely affecting equity issues—in Great Britain, where public private partnerships were widely used, did not materialize).

⁵¹ CONSTR. LAW COMM. (2011), *supra* note 1, at 8. See also *supra* note 23 related to allocative efficiencies in contrast to production efficiencies; some of the imbalance between the two sectors with respect to the production efficiency metric is due to the absence of constraints that bind the public sector.

⁵² CONSTR. LAW COMM. (2011), *supra* note 1, at 8; see also de Bettignies & Ross, *supra* note 19, at 139, 143–44, 147–49 (arguing that private sector contractors are more efficient than the public sector in completing projects).

⁵³ Pollock et al., *supra* note 50, at 1205–06.

⁵⁴ Dannin, *supra* note 9, at 83–84; Pollock et al., *supra* note 50, at 1205.

⁵⁵ de Bettignies & Ross, *supra* note 19, at 137–38 (outlining four principle tasks involved in the development of goods and services and explaining how these tasks should be distributed in a public-private partnership).

private finance.”⁵⁶

Once the conceptual hard-stop between public finance law and public construction procurement law is removed, it is then possible to view public capital project finance and public project procurement (which is also functionally public project delivery)⁵⁷ in a manner that integrates both aspects as shown in the MIT Framework.⁵⁸ Viewed in this integrated framework, the polysemous public-private partnership methodology has three variations of a “[c]ombined [p]roject [d]elivery [m]ethod.”⁵⁹ The first two variations occupy the quadrant where there is direct public project finance—one with only public funding, and the other with a mix of public and private funding—and the third variation occupies the quadrant where there is only indirect public project finance in the form of user fees to repay pure private project finance.⁶⁰ The MIT Framework underlies the 2007 Model Code for Public Infrastructure Procurement (MC PIP),⁶¹ and is consistent with economic analysis on public-private partnerships that locates the public-private partnership “somewhere between simple *contracting-out* and a *fully private market* in the spectrum of private versus public involvement.”⁶²

⁵⁶ Pollock et al., *supra* note 50, at 1205.

⁵⁷ The disciplinary lens through which a researcher looks at issues raised in the built environment will simultaneously explain phenomena, but run a risk of limiting insights. A continuing series of research viewing issues as a combination of procurement method and contract form from the economics perspective of buyer and seller, can explain a great deal. See Bajari, McMillan & Tadelis, *supra* note 8, at 374–75 (discussing how this applies to research on auctions and negotiations); see also Patrick Bajari & Steven Tadelis, *Incentive Versus Transaction Costs: A Theory of Procurement Contracts*, 32 RAND J. ECON. 387, 387–88 (2001) (discussing how this applies to research on cost-plus and fixed-price contracts); Patrick Bajari, Stephanie Houghton & Steven Tadelis, *Bidding for Incomplete Contracts: An Empirical Analysis* (Nat'l Bureau of Econ. Research, Working Paper No. 12051, 2006), available at <http://www.nber.org/papers/w12051> (discussing how this applies to “incomplete” procurement contracts). Economic analyses of the “procurement” decision and contract form, which focuses on the setting as a transaction between a buyer and seller, may, however, miss explanatory nuances perceivable from focusing on the project as a project, where the buyer is an owner and a designer and contractor become a team, whether serially connected or integrated in some way, to deliver a particular project to the owner.

⁵⁸ See Miller, *supra* note 6, at 6.

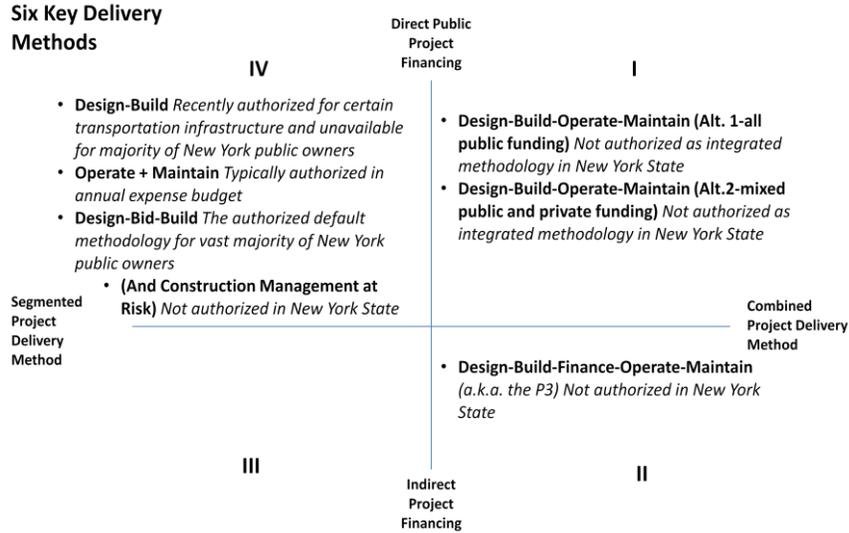
⁵⁹ See *infra* Table Two.

⁶⁰ See *infra* Table Two.

⁶¹ AM. BAR ASS'N, 2007 MODEL CODE FOR PUB. INFRASTRUCTURE PROCUREMENT, app. B (2007) [hereinafter 2007 MODEL CODE].

⁶² de Bettignie & Ross, *supra* note 19, at 138 (emphasis in original).

Table Two:



Dr. John B. Miller, *Life Cycle Delivery of Public Infrastructure: Precedents and Opportunities for the Commonwealth*, Pioneer Institute White Paper, No. 44, December 2008, p. 6 (emphasis added).

All three public-private partnership variations identified and authorized by the MC PIP require the use of the design-build methodology. One animating feature of the MC PIP, in stark contrast to New York State's statutory paradigm, is the conclusion that there is no single service delivery methodology appropriate for all owners and all projects.⁶³ The owner's ability to match a service delivery method from among all available methods to particular project circumstances enables a project team to increase its chances of meeting project performance goals on budget, schedule, quality, and safety.⁶⁴ The MC PIP provides public owners with flexibility⁶⁵ by authorizing all known service

⁶³ 2007 MODEL CODE, *supra* note 61, at app. B; Miller, *supra* note 6, at 29.

⁶⁴ CONSTR. LAW COMM. (2011), *supra* note 1, at 10–11; Miller, *supra* note 6, at 29; *see also* de Bettignies & Ross, *supra* note 19, at 145–46 (discussing information asymmetries).

⁶⁵ *But see* Bajari, McMillan & Tadelis, *supra* note 8, at 375 n.1 (citing Lisa J. Cameron, *Limiting Buyer Discretion: Effects on Performance and Price in Long-Term Contracts*, 90 AM. ECON. REV. 265 (2000)) (pointing to analysis focusing on

delivery methods, and also provides an evaluative process to accompany each method that satisfy a variety of public policy objectives which public owners, unlike private owners, must address.⁶⁶

IV. CLARIFYING THE FUNCTION OF DESIGN-BUILD

The MIT Framework suggests the many different arrangements of archetypal project participants—owner, designer, and constructor⁶⁷—to perform the tasks of a capital project, from “defining and designing the project” to “operating and maintaining the assets in order to deliver the product/service.”⁶⁸ One can assess the economic efficiency of various options to deliver capital projects, which economics views as asset-and-relationship-specific investments, at two points in time: before the deal is struck, or *ex ante*, and after the deal is struck, or *ex post*.⁶⁹ The economic efficiencies of any possible arrangement in relation to a particular project depend on how the arrangement solves the issues from *both* perspectives. As contracting parties, the participants: (1) negotiate these issues *ex ante* based on *ex ante* information and related information

“rigid rules for awarding contracts” in long-term contractual relationships that concluded “rigid rules for awarding contracts,” as opposed to flexible rules, “result in lower *ex ante* prices but a higher likelihood of *ex post* breach” (emphasis added).

⁶⁶ See *id.* at 395. After demonstrating a category of avoidable costs occasioned by the fixed price contract form, a hallmark of the design-bid-build methodology, on complex projects, the authors conclude:

The analysis suggests some possible drawbacks of [federal acquisition regulations] that force public sector bureaucrats to award fixed-price contracts by competitive bidding. Our results suggest that there is room to consider alternative ways to prevent corruption, like more costly but effective monitoring, and then allow the public sector to award contracts with the flexibility and speed used by the private sector. Given the sheer volume of public sector procurement, it is clear that this approach begs for more serious research and evaluation.

Id.

⁶⁷ The constructor is a term that contains, and obscures, a highly complex set of contractual arrangements that creates a corresponding highly complex set of management issues within the constructor actor and among the three archetypal participants. See Bajari & Tadelis, *supra* note 57, at 389–90; see also Iris D. Tommelein, David R. Riley & Greg A. Howell, *Parade Game: Impact of Work Flow Variability on Trade Performance*, 125 J. CONSTR. ENG'G & MGMT. 304, 304–05 (1999).

⁶⁸ de Bettignies & Ross, *supra* note 19, at 137.

⁶⁹ *Id.* at 139–40 (channeling Oliver Williamson’s transaction cost economic theory and others).

asymmetries; and (2) work within an incomplete contractual framework to negotiate within the *ex post* environment, where a totality of change (on the ground, within the external environment, and between the parties themselves, exacerbated by changing related information asymmetries) requires functional *ex post* negotiation to reflect such modifications. This is required if the contract is to work despite its terms and its legal fiction of completeness.⁷⁰

There is a relationship between project attributes and the optimal service delivery methodology used for the project. Specific project attributes that can increase or decrease the utility of a particular methodology include “the extent of a [project’s] scope definition, the need for schedule speed as well as certainty, the need for flexibility to make changes to the project during construction, the [institutional] capacity of the owner to participate effectively in the process, and general market conditions.”⁷¹ No single service delivery methodology is appropriate or optimal for all types of capital projects types, which are then made further specific by their associated particular attributes.⁷² An owner and project team can attempt to manipulate risk, efficiency, and innovation in design, construction, and operation by matching the various methodologies (with their respective strengths and weaknesses) with project-specific needs.⁷³

Viewed from this perspective then, a mismatch of service delivery methodology and the specific project circumstances will

⁷⁰ This represents an attempt to synthesize transaction cost economics and relational contracting for the limited purposes of this article. See, e.g., Oliver E. Williamson, *The Theory of the Firm as Governance Structure: From Choice to Contract*, 16 J. ECON. PERSP. 171, 174 (2002) (discussing how “[a]ll complex contracts are unavoidably incomplete.” (emphasis in original)); see generally Ian R. Macneil, *Contracts: Adjustment of Long-Term Economic Relations Under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U. L. REV. 854 (1978) (discussing the importance of flexibility and change); see also EDWARD W. MERROW, UNDERSTANDING THE OUTCOMES OF MEGAPROJECTS: A QUANTITATIVE ANALYSIS OF VERY LARGE CIVILIAN PROJECTS (1988); Bajari & Tadelis, *supra* note 57, at 387-389; William Ibbs, Long D. Nguyen & Seulkee Lee, *Quantified Impacts of Project Change*, J. PROF. ISSUES ENG’G EDUC. & PRAC. 45 (2007).

⁷¹ CONSTR. LWA. COMM. (2011), *supra* note 1, at 12; see also THE CONSTR. INDUS. INST. CONTRACTS TASK FORCE, IMPACT OF VARIOUS CONSTRUCTION CONTRACT TYPES AND CLAUSES ON PROJECT PERFORMANCE 10 (1986); C. WILLIAM IBBS ET AL., DETERMINING THE IMPACT OF VARIOUS CONSTRUCTION CONTRACT TYPES AND CLAUSES ON PROJECT PERFORMANCE 51 (1986).

⁷² Miller, *supra* note 6, at 29.

⁷³ *Id.* at 29–31; see also de Bettignies & Ross, *supra* note 19, at 139–40.

generate costs that could have been avoided with a better match. When the law constrains an owner's ability to use modern project management techniques that flow from the service delivery methodology, as New York State law does for the vast majority of its public owners, the project team selected by the owner will be less likely to be able to deliver a project within estimated budget, schedule, and quality parameters. When the optimal methodology, based on project characteristics and project team capacities, is design-build, which is not permitted for the vast majority of public owners in the state, costs that could have been avoided in an optimal situation are embedded into the annual public expense budgets in the form of debt service at every level of government in the state.⁷⁴

The design-build methodology combines two archetypal tasks in constructing capital assets: "defining and designing the project" and building the project.⁷⁵ Combining design and building tasks permits a project team to exploit "strong complementarities" of a technological nature across tasks and "an economy of scope,"⁷⁶ functionally reaping the benefits from a simulated recreation of the old "master builder" model in construction.⁷⁷ The design-build methodology itself is not reducible to a single organizational/contractual form.⁷⁸

Viewed functionally, design-build can be performed by a single provide entity in one contractual version, but the absence of design-bid-build's mandated separation of designer from constructor can simply provide an environment (accomplished through a variety of organizational and contract forms, to suit the project attributes) for separate designer and constructor entities to collaborate together during the design phase. It is during the design phase that constructor skill and judgment can inform the project design, reducing information asymmetries at the earliest

⁷⁴ See generally CONSTR. LAW COMM. (2011), *supra* note 1, at 15.

⁷⁵ de Bettignies & Ross, *supra* note 19, at 137.

⁷⁶ *Id.* at 143–44, 149.

⁷⁷ Philip L. Bruner, *The Historical Emergence of Construction Law*, 34 WM. MITCHELL L. REV. 1, 4–5 (2007).

⁷⁸ See Bajari, McMillan & Tadelis, *supra* note 8, at 374, 377–78 (discussing the mix of contract forms and performance through the perspectives of several lenses and foundational analysis on contract form, on a spectrum from fixed-price to cost-plus, and performance, on a spectrum from simple projects to complex projects, completed by IBBS ET AL., *supra* note 71, at 119); IBBS ET AL., *supra* note 71, at 1, 51 (consisting of multi-disciplinary qualitative investigations into project performance, contract form, and risk shifting provisions within contracts).

possible time, and reducing the chances of post-design changes.⁷⁹ A host of post-design changes typically occur under the traditional design-bid-build methodology because the methodology identifies the constructor entity after the design phase, and necessary changes arising from the constructor input become more expensive to implement post-design than they would have been had they been resolved and incorporated during the design phase.⁸⁰

Experience with parametric solid modeling software platforms and multidisciplinary design optimization (“MDO”) in the aerospace industry, which has elements of production control processes in common with those used in construction⁸¹ can provide some additional illustration of how eliminating mandatory separation of designer and construction with design-build can increase information symmetries and avoid costs.

MDO “is a methodology for the design of systems in which strong interactions between disciplines motivate designers to simultaneously manipulate variables in several disciplines[, and] involves the coordination of multiple disciplinary analyses to realize more effective solutions”⁸² The aerospace industry, aided by parametric solid modeling technology, has moved the application of this methodology to the conceptual phase of the design process in a more integrated manner.⁸³ Earlier integration of MDO increases the time in conceptual and preliminary design to “capture more knowledge,” and “retain[s] more design freedom later into the process in order to act on the new knowledge gained by analysis, experimentation, and human reasoning.”⁸⁴ MDO is a methodology that permits “gaining insight to the design space, quantitatively identifying trades and finding innovative design options.”⁸⁵

⁷⁹ See de Bettignies & Ross, *supra* note 19, at 145–46 (showing how bundling of tasks can reduce asymmetry of information among owner and contracted designers and constructors).

⁸⁰ PHILIPP GEYER & KLAUS RUECKERT, CONCEPTIONS FOR MDO IN STRUCTURAL DESIGN OF BUILDINGS 1 (2005).

⁸¹ AM. INST. OF AERONAUTICS & ASTRONAUTICS, CURRENT STATE OF THE ART ON MULTIDISCIPLINARY DESIGN OPTIMIZATION (MDO) 36 (1991); GLENN BALLARD & GREG HOWELL, WHAT KIND OF PRODUCTION IS CONSTRUCTION? (1998).

⁸² TIMOTHY W. SIMPSON, APPROACHES TO MULTIDISCIPLINARY DESIGN OPTIMIZATION, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA394802>.

⁸³ See AM. INST. OF AERONAUTICS & ASTRONAUTICS, *supra* note 81, at 36.

⁸⁴ *Id.* at 14.

⁸⁵ YANN DEREMAUX, KAREN WILLCOX & ROBERT HAIMES, AM. INST. OF AERONAUTICS & ASTRONAUTICS, PHYSICALLY-BASED, REAL-TIME VISUALIZATION

MDO also expands the focus of multi-disciplinary interactions from the “[r]obust design analysis,” aided by technology during the preliminary design phase,⁸⁶ to an overall perspective regarding system performance.⁸⁷ “By simultaneously considering the disciplines of interest,” it becomes possible to “coherently exploit the synergism of mutually interacting phenomena.”⁸⁸ “[B]etter integration of multi- and interdisciplinary design, analysis, and optimization” permits greater accounting for the “very large set of coupled equations” that are present in complex projects.⁸⁹

MDO can facilitate, earlier in the design phase, a “systematic approach to the integrated, concurrent design of products and related processes, including manufacturing and supportability” that *can* emphasize “consideration of all elements of the product life cycle from concept through disposal, including quality, cost, and schedule with traceability to user requirements.”⁹⁰ Translated to public capital infrastructure and structures, the collaboration of designer and constructor during the design phase can extend from assigning an optimum cost to constructing the designed thing to estimating an optimum cost to operating and maintaining the designed thing during its useful life, which typically is related to the debt service period related to the financing of the designed thing.⁹¹

In the aerospace industry, as in the building industry, application of MDO during the design phase increases the designer’s knowledge about the project when s/he has the greatest degree of freedom to explore the design space and change the design.⁹² Both systems’ design and building design follow the same pattern of project development and completion: first, conceptual, preliminary, and detailed design phases preceding manufacturing, and then production or construction phases.⁹³ For building design, the conceptual phase is attractive for design-

AND CONSTRAINT ANALYSIS IN MULTIDISCIPLINARY DESIGN OPTIMIZATION 1 (2003).

⁸⁶ Yann Deremaux, *Physically-Based, Real-Time Visualization and Constraint Analysis in Multidisciplinary Design Optimization 20* (June 2003) (unpublished M.S. dissertation, Massachusetts Institute of Technology).

⁸⁷ *Id.* at 21.

⁸⁸ *Id.*

⁸⁹ AM. INST. OF AERONAUTICS & ASTRONAUTICS, *supra* note 81, at 11, 14.

⁹⁰ *Id.* at 6.

⁹¹ *See id.* at 7.

⁹² DEREMAUX, WILLCOX & HAIMES, *supra* note 85, at 1.

⁹³ Deremaux, *supra* note 86, at 20–21.

build, the construction analog to MDO, due to the “strong interaction between the architectural design and the load-bearing structure of the building,” because “[a] later included optimization process would have either no particular effect on the design[,] or it would cause major effort for revising the planning because the effort for redesign increases superproportional[ly] the later a change takes place.”⁹⁴ Thus, permitting the integration of design and construction by removing the mandated separation of designer and constructor permits—an important kind of cost avoidance that is not about “dumbing down” or “cheapening” the design of a thing; rather it is about improving the design as it is actualized and used across the entire life cycle of the thing designed.

V. IMPEDIMENTS TO MODERNIZING NEW YORK PUBLIC CONSTRUCTION LAW FOR THE 21ST CENTURY BUILT ENVIRONMENT

If the preceding discussion was at all persuasive to some readers that New York’s current public construction procurement paradigm (in place and largely unchanged for decades) cannot be adequate for the 21st century needs it is important to follow with a discussion of the reasons such an archaic scheme persists in the face of federal programs and rhetoric at all levels of government extolling the economic benefits of public capital programs. To repeat the initial articulation above, design-build, initially a stand-alone service delivery methodology, is now a critical component of the modern service delivery methodologies that integrate finance and procurement/project delivery that is unavailable for the vast majority of New York’s public owners who are now well into the realities of the 21st century.⁹⁵

In the absence of broad access to this methodology, most New York public owners will not be able to avoid the costs associated with mandatory separation of complementary functions on projects that would benefit from the closer and earlier collaboration of those performing such functions. Moreover, most New York public owners will not be able to fully exploit modern

⁹⁴ GEYER & RUECKERT, *supra* note 80, at 1.

⁹⁵ See generally 2011 N.Y. Sess. Laws 109, 126–29 (McKinney) (authorizing design-build for horizontal infrastructure projects for four state-level public owners, who join the handful of other public owners, notably state-level public authorities, whose authorizing statutes can be interpreted to permit design-build).

building information modeling technologies, parametric solid modeling in construction—which permits all parties to contribute information earlier in the design, process in order to eliminate design configurations that produce conflicts and/or suboptimal designs from the construction point of view, that surface later in the construction phase under the traditional serial and segmented delivery methodology. So why is it that New York State, as both a public owner and regulator of subordinate public owners, does not permit public owner flexibility in deciding the service delivery method that is appropriate for each capital project in order to maximize the efficient expenditure of public funds and the economic benefits of capital programs across the state?⁹⁶

At a *Building in the 21st Century* conference series held at Albany Law School on October 21, 2011,⁹⁷ a member of the audience specifically asked the panelists focusing on the challenges posed by current law what their highest priority for change would be if they could get the state legislature to act on public construction procurement reform. All panelists agreed that the highest priority would be the ability to solicit members of the constructor team via a request for proposal process, with an award based on best value—with price as one of the several selection criteria, instead of the only criterion. The mandated focus on initial price alone makes long-term budget planning difficult, and contributes to inadequate investment in state of good repair activities for existing capital assets. Further, “[a]mong the factors that conspire against the [government’s] explicit and early assumption and planning for project life cycle costs as part of the initial public investment decision processes . . . the public design-bid-build methodology’s single-

⁹⁶ See CONSTR. LAW COMM. (2008), *supra* note 1, at 10; CONSTR. LAW COMM. (2011), *supra* note 1, at 8.

⁹⁷ See Conference, *CASE STUDIES IN PUBLIC CONSTRUCTION PROCUREMENT: At the Intersection of Built Environment Regulation and “On the Ground” Reality*, ALB. L. SCH. GOV’T L. CTR (Oct. 21, 2011), <http://publicauthorities.wordpress.com/2011/10/21/building-in-the-21st-century-conference-materials/> [hereinafter Conference]. This conference, entitled *CASE STUDIES IN PUBLIC CONSTRUCTION PROCUREMENT: At the Intersection of Built Environment Regulation and “On the Ground” Reality*, co-sponsored by the New York State Chapter of the American Institute of Architects, the New York City Bar Association, Albany Law School and Town+Gown, received a 2011 Excellence Award in Government Affairs from the Empire State Society of Association Executives, and an award from the American Institute of Architects. *Id.*

minded focus on initial costs is a significant abettor.”⁹⁸ During the question and answer session at the end of this event, a member of the audience asked why New York State had not yet modernized its laws, as the Commonwealth of Massachusetts had in 2004.⁹⁹ The answer proffered by those in attendance, the politics of construction in New York,¹⁰⁰ belies its simplicity.

The history of attempted reform of New York’s public construction procurement statutory scheme serves as a poster child for the ordinary form of entrenchment that occurs when an act of government “limits the policy choices available to future governments.”¹⁰¹ These laws, in unusually simple language, do not authorize any particular service delivery methodology, but they require those subject to them to use the methodology that was in place when they were enacted—a methodology that is no longer responsive to the needs of all modern projects.¹⁰² The conventional wisdom that holds these laws to have been enacted in response to corruption is critical.

The act of regulating by legislation distorts economic relationships that, over time, become the norm, creating groups invested in preserving the earlier-distortion-that-becomes-the-*status-quo*.¹⁰³ The ease with which these interest groups can effectively stop modernization or reform by government, as regulator, that would be in the economic interests of government, as public owner and agent of economic development,¹⁰⁴ by pointing to the earlier history of corruption to defend the *status quo* entrenchment, is almost akin to “dead-hand control[.]”¹⁰⁵ It is difficult to overcome this type of functional entrenchment in a fragmented environment,¹⁰⁶ where temporal issues surrounding

⁹⁸ CONSTR. LAW COMM. (2011), *supra* note 1, at 9–10; *see also* GEYER & RUECKERT, *supra* note 80, at 1; de Bettignies & Ross, *supra* note 19, at 139–40, 144–45.

⁹⁹ 2004 Mass. Legis. Serv. ch. 193 (West); *see generally* Conference, *supra* note 97.

¹⁰⁰ *See generally* Conference, *supra* note 97.

¹⁰¹ Serkin, *supra* note 11, at 888.

¹⁰² *See* BUILDING IN THE 21ST CENTURY, *supra* note 39, at 3–5, 19; *see also* CONSTR. LAW COMM. (2011), *supra* note 1, at 6.

¹⁰³ *See* Serkin, *supra* note 11, at 888, 891.

¹⁰⁴ *See id.* at 891.

¹⁰⁵ *See id.* at 901, 946.

¹⁰⁶ *See* MYERS, *supra* note 8, at 6–7, 10; *see also* Bruner, *supra* note 77, at 13–14 (discussing how construction law was designed around the unique culture and practices of industry, which brings together numerous individuals, including contractors, manufacturers, and architects); FAIRCLOUGH, *supra* note 8, at 14–15 (explaining that the construction industry is as fragmented as are its

capital programs discussed below conspire to further obscure the costs of the *status quo*.

These temporal budget issues are further exacerbated by the nature of government actors—the executive and legislators at any time—as parties in interest in a reverse entrenchment spiral. Those few who understand the potential for cost savings from reform will likely not be able to benefit during their tenure from any reforms enacted during their tenure. They will not benefit directly, in the annual expense budget exercises, from any future reduction non-discretionary debt service payments. The budget beneficiaries of reform will be future government officials.

The dimension of time in the public budgeting process poses analytical challenges in estimating the fiscal impact of legislative reforms related to delivery of capital programs funded in the capital budget. Time makes the analysis of the fiscal impact of a proposed capital budget reform much more complicated than an analysis of an expense budget proposal for an agency's operations.¹⁰⁷ A sophisticated budget horizon, considered by many to consist of the current year (adopted budget) and estimates for up to the following four fiscal years (financial plan period), is insufficient to account for the temporal realities of construction.¹⁰⁸ “[T]he investment decision methodology, which takes into account the debt service that finances a project, far outstrips any financial plan period, as do the real costs and benefits (negative and positive externalities)” that the sustainability agenda now highlights.¹⁰⁹ “Moreover, actual construction projects often span different political administrations, further attenuating the connection between the decision to invest and the budget consequences of such decision.”¹¹⁰

As if that were not enough of an impediment, avoided costs—or savings—in the capital budget, which finances the construction of a project, show up much later in the expense budget when associated non-discretionary debt service costs can crowd out other expense budget needs.¹¹¹ This disconnect between the

allied academic fields of analysis).

¹⁰⁷ CONSTR. LAW COMM. (2011), *supra* note 1, at 15.

¹⁰⁸ *Id.*

¹⁰⁹ TOWN+GOWN, ORIENTATION TO POLICY IN THE BUILT ENVIRONMENT 3, http://www.nyc.gov/html/ddc/downloads/pdf/town_and_gown/tg_orientation.pdf.

¹¹⁰ *Id.*

¹¹¹ See N.Y.C. INDEP. BUDGET OFFICE, UNDERSTANDING NEW YORK CITY'S BUDGET: A GUIDE TO THE CAPITAL BUDGET 2, 10 (2010).

capital and expense budget further exacerbates the pre-existing disconnect between decisions involving initial investment costs and long-term life cycle operation and management costs.¹¹² Any avoided costs in construction would thus have a mid- to long-term benefit, at best, in the expense budget.

But cost avoidance can be applied conceptually to a public owner's entire capital program. Applying what is known as the "portfolio approach to project delivery" to any of the state's public owner's capital programs, "resulting savings in cost on [one] project will allow another project in the collection—one that can't be delivered in that way—to proceed at all."¹¹³ If the reader remains optimistic that data-based analyses in the context of a portfolio approach could make a difference in the politics of construction, a conceptual methodology to estimate avoided costs from legislation authorizing the design-build methodology—or repealing the mandated divide of design from construction and award to lowest initial cost bid—for all New York public owners follows.

VI. CONCEPTUAL METHODOLOGY TO QUANTIFY BUDGET SAVINGS FROM STATUTORY MODERNIZATION

This last section is the promised conceptual methodology for the state as regulator for all public owners (including itself and its local governments) to permit estimation, for a fiscal impact statement, of avoided costs that could accrue from legislative authorization of design-build for all public owners.¹¹⁴ This methodology unfolds as follows. A consideration of the nature of avoided costs accruing to the capital budget due to a change in law must precede an estimation of their magnitude. A related conceptual issue is the appropriate baseline cost against which to measure cost growth that is itself complicated, and thus deferred from consideration in this article.¹¹⁵ Avoided costs in

¹¹² Rachael Rawlins & Robert Paterson, *Sustainable Buildings and Communities: Climate Change and the Case for Federal Standards*, 19 CORNELL J.L. & PUB. POL'Y 335, 352 (2010).

¹¹³ Miller, *supra* note 6, at 27.

¹¹⁴ See CONSTR. LAW COMM. (2011), *supra* note 1, at 12–16 (offering the first articulation of this roadmap).

¹¹⁵ At some point in the focus on avoidable costs or savings, there needs to be a consideration of the appropriate baseline cost against which to measure savings. There are many interrelated causes of cost growth, some of which are avoidable. Conceptually, the causes of cost increases are those things that

construction, thus quantified, would then be translated to savings in debt service accruing to the expense budget. Then these expense savings would be allocated among the various levels of government covered by a particular change in law that applied to all public owners.

A. Articulating Nature of Avoided Costs

Since there is no project delivery methodology appropriate for all types of construction projects and owner profiles, a single permitted methodology tends to make principal-agent alignment of interests difficult when project and owner characteristics are not suitable for that particular method, and when it is difficult to minimize information asymmetries.¹¹⁶ The mandated separation of designer and constructor prohibits the use of modern techniques such as design-build, as well as the fullest exploitation of modern tools such as building information modeling and integrated project delivery.¹¹⁷ It prevents the experience of the constructor to inform design options, and increases the chances of changes during construction in order to deal with a host of issues stemming from the later revelation of necessary facts related to construction that could not be raised during the design process.¹¹⁸

operate to render cost estimates and schedules incorrect. As noted in one study, “[i]n the simplest terms, deviations from cost or schedule occur because:”

- The estimates themselves were faulty
- Project execution was faulty, causing costs to be higher (and schedules longer) than necessary
- The project was changed—the thing estimated was not the thing actually built
- The macro-environment—the “state of the world”—assumed by the estimator was unrealistic, resulting in changes in the project or input costs.

MERROW, *supra* note 70, at 20 (discussing the conceptual model of cost growth in megaprojects); *see also* Bent Flyvbjerg, Mette Skamris Holm & Soren Buhl, *Underestimating Costs in Public Works Projects: Error or Lie?*, 68 J. AM. PLAN. ASS’N 279, 279 (2002) (discussing the cost “differences between actual and estimated costs in transportation infrastructure projects” and its implications).

¹¹⁶ *See* Bajari, McMillan & Tadelis, *supra* note 8, at 373–74; Bajari & Tadelis, *supra* note 57, at 388.

¹¹⁷ CONSTR. LAW COMM. (2008), *supra* note 1, at 4, 10.

¹¹⁸ *See* Bajari, Houghton & Tadelis, *supra* note 57, at 12–13 (discussing the sources of these adaptation—or avoidable—costs stemming from incomplete project design and specifications due to the nature of a complex project in a fixed price service delivery methodology: direct disruption and resources necessary for *ex post* contract renegotiation and dispute resolution); *see also* Bajari, McMillan & Tadelis, *supra* note 8, at 373–74 (discussing efficiency losses due to mismatch of contract form, which is necessitated by service delivery method, and project

In theory and applied analysis, it is possible to manage change whether owner-or contractor-directed and their related costs, but the ability to manage change during construction requires access to the full menu of service delivery methodologies, with their attendant management techniques.¹¹⁹ The owner's inability to match project delivery methodology to project needs and owner capacity and to bring the benefits of contractor experience, judgment, and skill to the project as soon as possible during the design phase, generates avoidable costs because changes occasioned later in the construction process from the progressive increase in project knowledge are more costly to accomplish than similar changes incorporated earlier in the design phase.¹²⁰

A single focus on initial construction costs tends to conspire against an owner's explicit and early assumption and planning for such life cycle costs as part of the initial investment decision process.¹²¹ This tendency exacerbates the public sector's historical lack of focus on operation and maintenance costs after initial construction, and contributes to problems with state of good repair of capital assets.¹²² The impact of inadequate budgeting for state of good repair activities or necessary operation and maintenance in the expense budget, while periodically surfacing in the press, is "largely invisible, encouraging the continuing cycle of deferred maintenance, until much higher than necessary

information generated *ex post* which, in alternative service delivery methodologies and contract forms permitting collaboration of designer and contractor during design phase, could have been made available *ex ante* construction contract pricing and execution); Bajari & Tadelis, *supra* note 57, at 388 (discussing the fact that "uncertainty [begins] about many important design change . . . after the contract is signed and production begins").

¹¹⁹ See Ibbs, Nguyen & Lee, *supra* note 70, at 45–47 (connecting project change with labor inefficiencies and disruptions to productivity); see also BALLARD & HOWELL, *supra* note 81 (discussing the applicability of lean principles to the construction industry); Peter E. D. Love, Zahir Irani & David J. Edwards, *A Rework Reduction Model for Construction Projects*, 51 IEEE TRANSACTIONS ON ENGINEERING MGMT. 426, 435–37 (2004) (discussing the ways in which a rework reduction model "could reduce errors and the potential for client initiated changes[,] from the design development phase through to the production process).

¹²⁰ See Mei Liu, *The Application of BIM and IPD in Public Design and Construction* (January 2013) (unpublished Ph.D. dissertation, New York University) (citing Love, Irani & Edwards, *supra* note 119; William Ibbs, *Impact of Change's Timing on Labor Productivity*, 131 J. CONSTRUCTION ENGINEERING & MGMT. 1219-1223 (2005)) (on file with author).

¹²¹ Miller, *supra* note 6, at 22.

¹²² *Id.*

capital replacement costs become necessary.”¹²³

The costs of failing to budget “to properly perform operations and maintenance services throughout the life cycle results in substantial additional overall expense, lower levels of service, damage to existing equipment, additional energy consumption and shortened useful life of existing facilities.”¹²⁴ Life cycle costs that could have been avoided by the analysis of such costs as part of the investment decision, or (at the latest) the decision to award the construction contract, appear later as marginally higher operation and maintenance costs, or (in the case of deferred maintenance) eventually as capital expenses for major repair or replacement.¹²⁵

B. Quantifying Avoided Costs

A small number of studies have attempted to quantify the performance of projects using the design-bid-build methodology as compared to those using the design-build methodology.¹²⁶ One study has asserted that using the design-build methodology can yield “*typical cost savings [of] 10% over DBB and typical time savings [of] 12% over DBB[,]*” assuming the public owner, in a competitive procurement process, has committed itself to “stable design requirements.”¹²⁷ These findings are not inconsistent with an earlier statistical evaluation, using multivariate regression analysis, of approximately 300 projects, as summarized below.¹²⁸

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.* at 23.

¹²⁶ *Id.* at 18 (reviewing four Massachusetts case studies).

¹²⁷ *Id.* at 21 (emphasis added).

¹²⁸ Mark Konchar & Victor Sanvido, *Comparison of U.S. Project Delivery Systems*, 124 J. CONSTRUCTION ENGINEERING & MGMT. 435, 441-443 (1998) (materials related to chart).

Metric	DB:DBB	DB:CM@Risk	CM@Risk:DBB
Unit Cost	At least 6.1% less	At least 4.5% less	At least 1.6% less
Construction Speed	at least 12% faster	at least 7% faster	at least 5.8% faster
Delivery Speed	at least 33.5% faster	at least 23.5% faster	at least 13.3% faster
Cost Growth	at least 5.2% less	at least 12.6% less	at least 7.8% less
Schedule Growth	at least 11.37% less	at least 2.18% less	at least 9.19% less

This analysis did not evaluate the root causes of cost and/or schedule growth, and was intended as a tool for owners to use in evaluating various service delivery methods along budget and schedule metrics.¹²⁹ While these findings were at odds with a later study that identified different results for regarding costs and productivity as measured by schedule, excluding “costs for and the time required for owner planning, management, advertisement, procurement, and administrative activities,”¹³⁰ they are consistent with findings from a recent analysis of roadway construction projects which estimated contractor adaptation costs stemming from a mismatch of contract/service delivery form (fixed price/design-bid-build) and project attributes (complex) to be “on average . . . [equal to] about ten percent of the winning bid.”¹³¹

¹²⁹ *Id.* at 435.

¹³⁰ CONSTR. LAW COMM. (2011), *supra* note 1, at 14; C. William Ibbs et al., *Project Delivery Systems and Project Change: Quantitative Analysis*, 129 J. CONSTRUCTION ENGINEERING & MGMT. 382, 383–87 (2003).

¹³¹ Bajari, Houghton & Tadelis, *supra* note 57, at 1.

Since only a percentage of projects within a public owner's capital program portfolio will benefit from a service delivery method other than the public design-bid-build methodology (to which avoided costs—or savings—would accrue) it is critical to identify that percentage of an owner's capital program to which to apply any of the above performance-related percentages. One study hypothesized the future of service delivery methodology use over the next 30 years, and noted that "[t]he vast majority of public infrastructure projects (75%) will continue to use design-bid-build (and Construction Management at Risk)", while "[t]he use of design-build will continue to expand (to 10% of all projects and approximately 5% of all expenditures)."¹³² Another study evaluated the mix of fixed price contracts (a proxy for the design-bid-build methodology) and cost-plus or negotiated contracts (a possible proxy for the design-build methodology) in a local private sector non-residential construction market, and found the mix to be 18% for fixed price contracts and 44% for negotiated.¹³³

A required focus on life cycle operation and maintenance costs as part of the initial investment decision can also generate avoided costs or savings.

Life cycle costs, some of which could be avoided as the result of a best value award methodology, are '150[–]200 times the cost of initial design[, and will appear in government budgets in the long-term, long after the initial investment, analytically circumscribed by the mechanics of the initial delivery methodologies, has been made.¹³⁴

Translating those estimates over the life of the asset, as a measure of magnitude of avoided long-term costs that can be realized by taking into consideration life cycle costs at the moment of the initial investment decision, "[c]ompetitive pricing for long term operations and maintenance can typically produce savings of 10 to 20% of life cycle costs."¹³⁵

C. Translating from Capital to Expense Budgets

The costs of public capital programs financed with the proceeds of bonds appear in a public owner's expense budget after construction "in the form of debt service, where they become a

¹³² Miller, *supra* note 6, at 34–35.

¹³³ Bajari, McMillan & Tadelis, *supra* note 8, at 1, 28.

¹³⁴ CONSTR. LAW COMM. (2011), *supra* note 1, at 15 (citing Miller, *supra* note 6, at 20).

¹³⁵ Miller, *supra* note 6, at 23 (emphasis added).

non-discretionary expense.”¹³⁶ This temporal divide creates the illusion (especially at the operating agency level) during the planning and construction phases, that capital projects are “free.”¹³⁷ Public budget practice and formal protocols, where they exist, treat debt service on an aggregated entity-wide basis, limiting both the opportunity to understand the relation between debt service, agencies, and their projects, as well as the ability of line agencies responsible for initiating capital projects to comprehend the impact of debt service occasioned by their capital programs on their annual operating budgets.¹³⁸ Debt service costs, however, eventually compete with line agencies’ needs in the expense budget when revenues decline or remain steady and expenses increase, increasing the debt service burden on the expense budget.¹³⁹

At present, the only tool government has now to reduce the debt service burden over time (when it estimates declines in the economy and resulting revenues) is to cut the pipeline of projects, all of which were deemed necessary at some point.¹⁴⁰ In view of the aggregate of avoidable costs currently in all public owners’ budgets due to the inefficiencies of a single mandated, outdated methodology, modernization along the lines of the MC PIP, broadly applied to all public owners, could provide long-term and recurring savings in projected debt service costs. Thus, avoided costs could be translated into marginally lower construction costs financed with long-term debt, resulting in marginally lower related debt service costs over the life of the debt—or expense budget savings.

D. Allocating Avoided Costs Across Government Levels

The last step in the analysis involves applying all the preceding steps to an interdependent system of state and local level entities. Conceptually, there are two functional concepts of government at work here: first, all government entities in the State, as public

¹³⁶ CONSTR. LAW COMM. (2011), *supra* note 1, at 15.

¹³⁷ “The weak connection between capital program decisions at the agency level and their impact on the operating budget is made more tenuous by the length of time from the planning of a project, scoping a project, awarding the contracts, constructing and commissioning the project and, finally, debt service payments.” CONSTR. LAW COMM. (2011), *supra* note 1, at 15.

¹³⁸ *Id.*

¹³⁹ *Id.*

¹⁴⁰ *Id.*

owners of capital projects; and then the State level of government as the provider of subsidies to subordinate units of government, lowering, in some way, the cost of projects and/or incrementally increasing projects. At each governmental level, from the public owner perspective, a grant of service delivery flexibility and related avoided costs would permit the public owner either to plan for reductions in future debt service costs or, keeping the planned level of capital expenditure the same, stretch available resources to meet planned incrementally increased capital needs using a portfolio approach.¹⁴¹ From the intergovernmental perspective, authorizing alternative service delivery methods at the local government and state-created authority level—modernizing the State’s public procurement laws—is a form of “mandate relief, creating the possibility of incrementally reducing the level of State subsidy expenditures without negatively impacting local service levels.”¹⁴²

¹⁴¹ See CONSTR. LAW COMM. (2011), *supra* note 1, at 16 (discussing the “portfolio approach” to product delivery (citing Miller, *supra* note 6, at 27)).

¹⁴² *Id.*



Projects Benefitting from Service Delivery Flexibility

Using alternative methodologies

Mark Blumkin

November 12, 2014



Projects Benefitting from Service Delivery Flexibility

Agenda

Panel 1—The Role of Built Environment in Economics and Public Policy

A discussion about the roles that effective and efficient public infrastructure programs and efficient and strong construction markets play in local, regional and state economies and related public policy issues

Panel 2—Case Studies of Projects Benefitting from Service Delivery Flexibility

A multi-disciplinary discussion of case study projects using alternative service delivery methodologies

Panel 3—The Massachusetts Reform Approach and New York

An exploration of the Massachusetts reform approach, identifying aspects that could be useful in New York

Case Study

University Health System, San Antonio, TX



- **Program Scope:** New 770 bed tower, parking garage, 200,000 SF downtown clinic
- **Total Project Cost:** \$1.0 Billion
- **Delivery Method:** CM at Risk
- **Program Manager:** Jacobs and Broaddus-Munoz
- **Construction Manager:** JV: Zachary/Vaughan/Layton
- **Lead Architect:** Perkins & Will

Case Study

Parkland Hospital System, Dallas, TX



- **Program Scope:** New 824 bed tower, utility building, parking garage
- **Total Project Cost:** \$1.3 Billion
- **Delivery Method:** CM at Risk
- **Program Manager:** CH2M Hill
- **Construction Manager:** JV: Balfour Beatty, Austin Commercial, HJ Russell and Azteca
- **Lead Architect:** HDR/Corgan



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**The Construction Law Committee of
The New York City Bar Association**

21st Century Construction 20th Century Construction Law

Update

February 2014

EXECUTIVE SUMMARY

Construction of all elements of the built environment—from infrastructure for transportation of people and commodities, including energy and telecommunications, and parks to buildings for purposes as varied as residential, educational, health care, commercial, manufacturing and cultural—is both a reflection of a jurisdiction’s economic condition and a generator of its future economic conditions. All of the built environment, its participants and their products are regulated by all three levels of government, but in New York State, the most significant built environment laws are at the state level. It is to the Governor and Legislature we address these recommendations.

The Construction Law Committee continues to urge the State to completely overhaul its archaic and counterproductive statutory scheme for publicly and privately constructed and financed elements of the built environment across the State to match the needs of 21st Century construction projects. Since change in this area is likely to be of an incremental nature, however, the Committee makes the following recommendations to the Governor and Legislature for consideration in the near-term:

- Expand the authorization of the design-build methodology to include its use for all types of structures, and additionally authorize the construction-management-at-risk methodology, for all New York Public owners
- Remove the regulatory chilling effect on the design-build methodology in current legislation and resolve regulatory inconsistencies
- Expand the New York City Educational Construction Fund model to all public school districts and for other building typologies such as public health care clinics and ambulatory care facilities to further leverage the benefits of private multi-use development projects when and where they occur

The ultimate goal of our recommendations on public construction procurement is for the State to provide all New York public owners with all procurement and delivery modes, as necessary and appropriate, to materially reduce costs, speed delivery and improve quality and safety.

Past as Prologue

The New York City Bar Association’s Construction Law Committee (the “Committee”) has, for the last ten years, urged the Governor and the State Legislature to embark on wholesale modernization of outdated State laws affecting every aspect of our built environment, both publicly and privately financed and constructed.¹ In 2008, the Committee said:

The Construction Law Committee, like other Committees before it, believes that mandatory multiple prime contracting² has no place in modern public construction and that the entire statutory scheme for public procurement must be overhauled to promote flexibility and innovation and reflect contemporary trends in service delivery methodology.³ This Committee, however, further believes the State must engage in a rigorous review of the entire statutory scheme for construction and its products, both publicly and privately financed, to bring New York’s construction industry into the 21st century, unleashing its economic potential.⁴

Similar to the way that built objects and systems have a tendency to remain in place after the conditions and theories that supported their creation have been eliminated or discredited, so too written products, such as laws. The State’s disparate collection of built environment laws contain imprints of earlier ways of viewing social conditions, relationships and needs that require review and revision to assure they are not at odds with changed conditions, relationships and needs decades later. Words—and the concepts and viewpoints embedded in them—matter. Having emerged from an earlier time, these laws may shackle contemporary actors engaged in activities that are the functional equivalents of those covered by the older laws but that have evolved over time with education and technology. A preliminary survey conducted by the Committee to “age” the State’s built environment statutes reveals that 14 percent of our current laws had been originally enacted by the time of the Great Depression in 1929, 37 percent by the end of World War 2 and close to half by 1960, a period of time that largely coincided with the construction of the region’s major public works systems and the career of Robert Moses.⁵ In the second half of the last century, 30 percent of current laws were enacted during the three decades that spanned 1960 to 1990. The adoption rate in the first full decade of the 21st century was a pale shadow of the rates of adoption of those preceding three decades. Inspired by the first stirrings of construction law reform in the spring and summer of 2007, in the form of proposals providing public owners with some relief from the mandatory multiple prime contracting requirements, the Committee noted that the State,

”in its economic policy role, should strive to permit the State and its local governments, in their role as owner and client, to have flexibility in deciding, like private owners, what service delivery method is appropriate for their various capital projects” and recommended that the Governor and Legislature consider, as a basis of reform, the model code that became the American Bar Association’s Model Code for Public Infrastructure Procurement (the MCPIP).⁶

Not long after the Committee’s 2008 Report was released, the civic conversation across the State centered on public-private partnerships as a way to solve the recognized failure of public owners across the State to maintain their existing infrastructure in a “state of good repair” as well as the generalized concerns that public owners would be unable to build new infrastructure to support improving the State’s economic performance. This Committee recommended, in its 2011 Update, that the State adopt the MCPIP, and took the added step of providing the form of draft legislation, based on the MCPIP, in an appendix to the 2011 Update, because:

[t]he MCPIP, based upon the experiences of state and local governments across the country that enacted provisions from the earlier 1979 Model Code as well as upon academic research, provides model statutory language to authorize all modern service delivery methods as options for public owners to match service delivery with project needs and owner capacity. It expresses these options in general functional terms that can accommodate changes in practice over time and it specifically authorizes public owners to use competitive sealed proposals awarded based on best value criteria. All MCPIP methods depend upon the public owner first establishing the functional requirements of a project, which are to be part of any solicitation document. The MCPIP authorizes the traditional design-bid-build methodology, which will continue to remain an appropriate option for a significant proportion of any public capital program, but it also permits authorization of construction manager at risk, as a variation of design-bid-build. It authorizes design-build, which permits an earlier collaboration among the designer, contractor and owner, permitting changes to the project during the early design phase when change is effectively cost-free. It also authorizes design-build-finance-operate-and-maintain and design-build-operate-and-maintain, which are types of public private partnerships that highlight the finance aspect. The design-build-finance-operate-and-maintain methodology specifically prohibits any public funding, while the design-build-operate-maintain methodology can be financed exclusively on a public funds basis

or on a mixed public and private funds basis. All methodologies except design-bid-build require a competitive sealed proposal solicitation process with an award based on best value criteria, permitting an integrated focus on a project's initial construction cost and its life cycle costs.⁷

While “[p]ublic construction is, by definition, a form of public private partnership”, this Committee believed what needed to occur for New York public owners to be able to use the integrated public-private partnership financing model then widely advocated during the latter half of the last decade, was not reform of the State’s public finance laws, but rather reform of its public construction procurement laws—specifically, general authorization of the design-build methodology, which is a necessary condition for use of the integrated public private partnership financing model.⁸ This Committee was hopeful that “[s]ince New York’s public finance laws already permit the financing of public-private partnership types of projects, subject to federal tax limitations, the conversation about public-private partnerships [would] help focus attention on the need to modernize public construction procurement laws by highlighting the one essential feature that has been missing for the majority of New York public owners—those service delivery methodologies that developed since the heyday of design-bid-build.”⁹ While this Committee was then, as now, committed to the proposition that all public owners in the State should have access to all service delivery methodologies along the lines of the MCPPI, the rage for public-private partnerships required this Committee to focus on elements of the design-build methodology:

A critical feature of the private public partnership model is the embedded design-build methodology that permits the designer and the contractor to work together on the design and its constructability, maximizing the utility of building information modeling technology as well as integrated project delivery tools, greatly enhancing the project team’s control over schedule and, thus, costs to stay within the parameters of the owner's stated functional scope and price. * * * Optimum efficiency and cost effectiveness in construction requires the integration of owners, designers and constructors on collaborative teams from project conception until commissioning at project completion, focusing on the owner's needs as the yardstick against which to measure performance. Additionally, the benefits of building information modeling technology and integrated project management techniques (if not the contract form) are maximized by the earliest possible collaboration of project team stakeholders. This working environment is simply not possible for public

projects under the currently mandated public design-bid-build methodology. In addition, the selection methodology requiring award to the bidder with the lowest initial cost exacerbates the public sector's lack of focus on operation and maintenance costs after initial construction, which contributes to inadequate investment in state of good repair activities for existing capital assets. Among the factors that conspire against the explicit and early assumption and planning for project life cycle costs as part of the initial public investment decision processes, such as the politics of capital programs, the public design-bid-build methodology's single-minded focus on initial costs is a significant abettor. Yet, while the design-build methodology embedded in public private partnership methodology is a useful arrangement, there is no single optimal project delivery methodology for all types of construction projects. It is the owner's ability to select a service delivery method from among all available methods and match it with specific project circumstances, such as the extent of scope definition, the need for schedule speed as well as certainty, the need for flexibility to make changes to the project during construction, the capacity of the owner to participate in the process and general market conditions, that enables a project team to increase its chances of meeting project performance goals of budget, schedule, quality and safety. A mismatch of service delivery methodology and the specific project circumstances will generate costs that could have been avoided with a better match. When the law constrains an owner's ability to use modern project management techniques, the owner will be less likely to be to deliver a project within its estimated budget, schedule and quality parameters.¹⁰

Three years later as 2014 begins, failure to keep all the State's built environment law consistent with 21st century needs and capabilities not only impedes meeting those needs by keeping participants from exploiting modern techniques, technologies and tools to effectively manage cost, schedule, quality and safety, but also increases the chances of unintended negative consequences, some at odds with the original intent of the archaic laws. At the core of the Committee's work is an acknowledgement of the complex role of government that operates simultaneously in different roles and at multiple levels in the built environment. This Committee will take advantage of events and trends that have occurred since the 2011 Update to provide this addendum to our earlier Reports.

Intervening Events and Trends on the Road to Complete Modernization of the State's Built Environment Laws

There have been several changes in the built environment since our last report in March 2011. On December 7, 2011, the State adopted the Infrastructure Investment Act (the Act),¹¹ authorizing the use of the design-build methodology for physical infrastructure projects costing at least \$1.2 million to a handful of state-level public owners of horizontal infrastructure.¹² The legislative findings and declarations covered the spectrum of rhetoric from the role of infrastructure investment in the economy to efficiencies obtainable via the design-build methodology to encouraging private sector capital investment (public private partnerships). The timing of the Act, however, suggests that its immediate impetus was the need to repair infrastructure destroyed by Tropical Storm Lee, as well as the critical need to replace the Tappan Zee Bridge and become eligible for federal transportation grant programs that require the grantee utilize the design-build methodology to manage cost during construction. Proposed legislation accompanying the Governor's recent executive budget submission would expand the Act's authorization of the design-build methodology to most local governments across the state for physical infrastructure not subject to the State's multiple prime contracting requirement.¹³

In addition, since early 2011, there has been increasing use of building information modeling (BIM) on private and public projects numbers of public and private owners. The use of BIM, as a tool, during all phases of a project, in what has been described as an industry that time had forgotten,¹⁴ will permit project participants to avoid and better manage costs for a number of reasons, the most critical of which is the reduction of gaps in information transfer and coordination errors among project participants, thus reducing the chances of often massive rework during the construction phase, which is far more disruptive and expensive compared to early identification of error or the need to change during the design phase. Until parametric solid modeling, which had been used in aerospace and automobile industries, arrived in construction industry in the form of BIM, the ability of technology to reduce schedule and cost volatility was a dream. With BIM, it is now possible to avoid conditions leading to delays in schedule and cost overruns. Moreover, a logical consequence of BIM use in design has been the accelerated and accurate translation of design drawings to shop drawings via BIM programs and the increase in off-site industrial production of modular building elements assembled in place at the site. While project participants can use BIM in conjunction with all service delivery methodologies, the ability to maximize its potential for managing cost, schedule, quality and safety variables on a project requires the earliest intensive participation of the actual constructor in the design process, which is simply not possible in the conventional design-bid-build process which, on public works projects, requires the separation of designer and

constructor until the lowest competitive price is selected and the prime constructor entities (due to Wicks Law) are able to be identified.¹⁵ Finally, a wealth of data that can be generated at multiple levels from a BIM model that is used throughout the life cycle of a project, from design to operation and maintenance, has the potential to be available at the enterprise level for management purposes and, if the enterprise is also a public entity acting in the roles of owner, regulator and economic development catalyst, for public policy analysis purposes.¹⁶

Renew the Infrastructure Investment Act and Expand Its Authorization of Design-Build Methodology, as well as Authorize Construction Management at Risk, for All New York Public Owners

Set to expire on December 7, 2014, the Act authorized the design-build service methodology for infrastructure projects to a handful of State owners of horizontal infrastructure, while, as noted above, legislation proposed by the Governor, would expand the such authorization to some local governments for a subset of such infrastructure projects.. While this Committee cannot stress enough its continuing position, from the 2008 Report, that the State should modernize all of the State’s built environment laws, including authorizing full service delivery flexibility for all public project types to all its agencies and authorities and to its subordinate entities such as school districts, authorities and local governments, using the MCPIP as a model, we are also realistic. Anyone who has studied New York legislative history in the area of the built environment cannot escape the reality of the State’s historic practice of incremental legislative change. Thus, this Committee focuses on the proposed legislation and the Act’s sunset date to urge the Governor and Legislature to evaluate the nature and magnitude of avoided costs on design-build projects completed under the Act¹⁷ and investigate implementation issues experienced by the effected agencies, with the ultimate goal of renewing design-build authorization to all public owners in the State, eliminating project type restrictions on the use of design-build¹⁸ and add, as an alternative service delivery methodology available to all public owners, the construction-management-at-risk (CM@Risk) methodology. Though CM@Risk is a variety of the traditional design-bid-build methodology, it shares, with the design-build methodology, the ability of designer and constructor to collaborate during the design phase, which permits the avoidance of certain costs attributable to the separation of the two participants during the process. Finally, since multiple prime contracting, which, among other things, requires “the owner [to hold] separate contracts with specialized contractors and [have] the responsibility of managing, or hiring someone to manage the project schedule and budget,” is technically inconsistent with design-build and CM@Risk methodologies, the State will need to revise its mandatory prime contracting requirement either to make it an optional tool for public owners as a general matter or to eliminate it as a requirement for design-build or CM@Risk methodologies, relying on other safeguards, provided in the MCPIP, to balance the

public policies underlying the State's mandatory prime requirement.¹⁹ We urge the Governor and Legislature look to the form and content of the MCPIP to inform the State's efforts to modernize elements of its public construction procurement laws as discussed above.

Some view "construction [as] essentially a design process", more like product development and less like factory production, at a specific site that requires on site assembly.²⁰ Compared to design-bid-build, which is a segmented, sequential method susceptible to gaps and errors in information transfer with associated costs, the design-build methodology, which brings together the designer and constructor during the design phase, is more integrated, permitting the design-build team to structure and manage elements of uncertainty, complexity and scheduling during the design phase in ways that resonate positively to the end of project completion.²¹ As a result of the early marketing efforts of design-build that focused on design-build as a cost-containment tool, there appears to be ingrained misunderstanding and resistance within segments of the built environment community about design-build—it is not uncommon to hear about the evils of design-build as cheapening the design of a project or increasing safety risks. Such advocacy misses the point and does a grave disservice to public owners, with public works programs spanning the spectrum from simple to complex projects. Simply put, all public owners should have every service delivery methodology, including design-build, available for them to use as they deem appropriate for all project types, both vertical and horizontal.

The ability of the constructor entity to participate with the designer team at the earliest possible time during the design phase—something that is simply not possible with the traditional design-bid-build methodology—is the significant characteristic of both the design-build methodology and the CM@Risk methodology that informs this Committee's recommendation. Both design-build and CM@Risk, as conceived by the MCPIP,²² permit designer and constructor collaboration during design to reduce the likelihood of rework and related delay costs due to the fragmentation of knowledge and gaps and errors in information transfer throughout the process by integrating the "strong complementaries" that the "master builder" possessed before the dynamics of modern industrial specialization forced the previously integrated project definition and design function and the building function apart from each other.²³ In a design-build environment, the constructor can contribute its "skill and judgment [to] inform the project design, reducing information asymmetries at the earliest possible time and reducing the chances of post-design changes."²⁴ The BIM tool can then leverage these "strong complementaries", permitting a project team to approximate some of the original master builder unity wrought asunder by modern industrial imperatives.

The early experience of the Commonwealth of Massachusetts, with its 2004 construction law reform authorizing CM@Risk for all public owners, supports the criticality of public owners' ability to bring constructors into the design process to manage and control cost and schedule. In Massachusetts, public owners electing to use CM@Risk have the ability to hire a construction manager before the design is completed to assist the owner and designer during the design process.²⁵ The reform also gives owners the ability to require the construction manager commit to a guaranteed maximum price (GMP) contract as early as 60 percent of design document completion.²⁶ In the review by the Office of the Inspector General (OIG) of public owners' experience with the CM@Risk, as required by the law authorizing CM@Risk, the OIG found "clear and consistent" evidence of public owner satisfaction with the CM@Risk method.²⁷ Of the reasons stated for such satisfaction, "the benefits most often cited by owners included the owner's ability to factor experience and capacity in the CM at risk selection decision, the preconstruction services provided by the CM@Risk firm, the collaborative and productive working relationship among the participants on at CM at risk project and the schedule savings from early construction work."²⁸ At the conclusion of five years of the reform's implementation, the striking fact that all public owners "negotiated the GMP contracts when design documents were complete or nearly complete and, in most cases, after construction work on the projects had begun,"²⁹ analogous to the timing of price in the design-bid-build methodology, suggests that the primary benefit of the CM@Risk methodology to public owners has been the ability to bring the constructor into the design process.

Thus the benefits of design-build and CM@Risk that argue for wide authorization stem from the ability to bring the designer and constructor together during the design phase to permit them to manage project cost, schedule, quality and safety and avoid construction costs attributable to the forced separation required by design-bid-build, when the public owner decides it is appropriate for the project at hand. Public owner funds equivalent to the amount of costs thus avoided would then be available to bring forward other projects in the owner's project pipeline or, if such projects were not to be accelerated, to avoid related debt service costs in the future.³⁰ By permitting the designer and builder—which is, in reality, a constellation of constructor and design entities with the general contractor at the apex—to collaborate fully during the design phase, before a single shovel hits the dirt, benefits the owner—which, in the public sector, translates into the taxpayer/citizen/user. When BIM becomes the standard of practice, the State's failure to authorize the design build methodology and/or CM@Risk, both of which directly involve the constructor during the design phase of a project, across the board to all public owners will limit their ability to realize increases in value by reducing the avoidable costs that BIM facilitates.³¹ Failing thus to modernize public construction procurement law will not only keep the State from achieving its articulated goals with respect to infrastructure maintenance and expansion across the State at every level of

government, but will also render whatever infrastructure and public building are completed to be more expensive than was necessary at completion and delinked from any consideration of the relation of initial design cost decisions to life cycle operation and maintenance costs, all examples of wasted scarce capital and expense budget resources.

Remove the Regulatory Chilling Effect on Design-Build in the Act and Resolve Regulatory Inconsistencies

The existence of text in Section 12 of the Act poses issues that will need to be resolved in the event the State renews the Act as is or extends the design-build methodology in the Act to all public owners. Section 12 provides that participation in a design-build contract under the Act will not be construed to be a violation Section 6512 of the Education Law, which applies to all licensed professionals covered by the Education Law, including architects and engineers, and which makes the unauthorized practice of architecture and engineering a crime. The presence of this provision in the Act authorizing design-build on certain public work suggests that its absence renders architects and engineers unable to engage in private sector design-build projects without being in violation of the Education Law. In addition, the suggestion raised by this language in legislation affecting public projects now also implicates private projects despite the absence of a statutory prohibition of design-build for private projects and the existence of strong case law supporting private sector use of the design-build methodology, case law that we believe the State Department of Education (the Department) has, frankly, declined to follow to one degree or another.

New York not only limits design-build on public construction projects by mandating design-bid-build on the vast majority of public projects, but it also appears to permit positions taken by the Department, which licenses architects and engineers,³² to further limit design-build on both public and private construction projects.³³ The Department's regulatory practice strongly discourages the architects and engineers it licenses from participating on design-build projects through its interpretation and enforcement of various Education Law provisions.³⁴ New York courts have supported the design-build methodology, as conventionally understood and practiced, on private construction projects, by upholding contracts in which the design-build entity enters into a separate contract with the design professional for services.³⁵ Thus, for private construction projects, New York courts permit architects and engineers to provide their professional services in connection with design-build projects so long as they enter into a variation of the construction management contract, in which the contractor contracts with the owner for the design-build project and then separately contracts with a design professional for the architecture services for the project.³⁶ Requiring the insertion of an extra contractual device in order for New York owners to utilize design-build to manage schedule and cost risk

can add legal complexity and exacerbate the high level of adversarial posturing among participants on New York construction projects.

Policy interests advanced in support of this regulatory position consist of preserving an independence of the design professional, free from “unlicensed oversight,”³⁷ and maintaining a connection between the design professional and owner. In 1996, the Education Department promulgated a “delegation exception” rule, which expressly allows the engineers to be retained by unlicensed entities and thus provide engineering services on projects.³⁸ This exception, though, has limited scope and is used for supplemental, rather than substantial, engineering services.³⁹ The dichotomy between the statutes and case law and the gaps in the licensing statute create a chilling effect on the practice of design-build and, in connection with the renewal and extension of the Act as recommended above, it is necessary to revise the Act and the Education Law and its regulations to clearly allow alternate project delivery methods for private and public owners, while balancing the various policy interests and providing adequate safeguards, which the MCPIP does.

The foregoing reflects a state of a skirmish between designers and contractors about the control of the design-build process which has added to the considerable amount of flotsam and jetsam in the wake of the design-build methodology. The focus on control as between designer and contractor does not serve the interests of the project or of the owner,⁴⁰ and the debate between *designer-led* design-build and *contractor-led* design build diverts attention from the benefits to a project from closer collaboration between designer and contractor. Added to the chilling effect described above, this ongoing conflict has resulted in a standoff that denies New York owners—both public and private—increased schedule and cost control that can consistent with project quality or safety,⁴¹ and the ability to leverage BIM capabilities to assist all project participants in achieving the optimum project parameters for cost, schedule, quality and safety.

The MCPIP statutory framework for design-build puts the locus of control with the public owner, establishing baseline conditions that assure adequate professional input for the public owner engaging in a design-build procurement. The MCPIP begins by simply defining design-build as a project delivery method in which the public owner enters into a single contract for the design and construction of a project, but requires, as a pre-condition, that the public owner establish, in conjunction with a designer on the staff of the public owner or under contract, the project’s design criteria or requirements.⁴² The owner must use a competitive sealed proposal to solicit and evaluate proposals from designer constructor entities and negotiate and award the contract for the best proposal, instead of public bid methodology to identify and award to the contractor proposing the lowest initial cost.⁴³ The MCPIP not only leaves open how the owner can select the designer to assist it with development of design

criteria or requirements prior to the solicitation and the nature of the solicitation details, it also leaves the nature of the design-build single contract open, permitting all types of contracts with the exception of the cost-plus-a-percentage-of-cost contract, which it expressly prohibits,⁴⁴ and it conditions the use of a cost-reimbursement contract upon a determination by the governmental entity that such contract is likely to be less costly than other contract types or it is impracticable to use other contract types.⁴⁵ The MCPIP's structure and approach empowers the public owner to match tools with project needs and its own internal capacities, while still establishing a necessary framework for safeguards within the fabric of the code. This modern methodology is completely at odds with the archaic statutory paradigm that limits what public owners can do as a way to protect against potential abuses and lapses in judgment, such as limiting public owners to traditional design-bid-build, which is familiar to all and provides a segmented process that is thought to provide serial focus points for oversight. Some more modern laws authorizing alternative delivery methods still take this paternalistic approach and assume that public owners previously limited to traditional methodologies will not know how to manage more modern techniques and attempt to compensate for the familiar opportunities for abuse and lapses in judgment by inserting an operational apparatus aimed especially at preventing lapses in judgment.⁴⁶ Concerns about public owner capacity to change management practices and agency culture after years of constraint are real, and the MCPIP's format provides opportunities to add provisions to address them. While, as the saying goes, the "devil is in the details", it is better to focus on the details within the framework of a modern code than attempt to advance archaic laws into present time.

The construction market has been saturated over time with myriad standardized contracts, often prefaced with various acronyms, some of which have been written by the trade and professional groups representing the archetypal participants, that over time have contributed to the conventional sense that design-build must be a "fast tracked" method or must have a "guaranteed maximum price" element.⁴⁷ To the extent these standard contracts focus on one or two project variables, such as schedule or price, at the expense of the other important variables, such as quality, safety and lifecycle costs, they have contributed to a litany of misunderstandings associated with design-build. The design-build methodology, however, is a vessel with respect to which the parties can negotiate all aspects of their ad hoc relationship on a particular project.⁴⁸ In the renewal and extension of the Act, the drafters must make it as clear as it is in the MCPIP that the parties to a design-build contract, including the design professionals, are free to design the contract or contracts that serve the schedule, cost, quality and safety needs of the project designed and built, without the licensed professionals being in fear of losing their license so long as they perform their professional obligations in the context of a robustly regulated industry. With project needs and the owner's financial resources serving as both objectives and limits for contract drafters, parties to a design-build contract,

free from standard contract product provisions that represent some archetypal ideal of risk allocation, can incorporate such principles of integrated project delivery and support such data-driven management tools,⁴⁹ as the parties deem appropriate for their capacity mix and the project needs.⁵⁰

Expand the Educational Construction Fund Model to All School Districts and for Other Public Building Typologies

It remains the Committee's position that the largest impediment to "public private partnerships" at all levels of government is not a matter of public finance law but rather one of public procurement laws—specifically, the lack of general design-build authority, as authorized in the MCPPI, which is the *sine qua non* of design-build-operate-maintain (publicly funded public private partnerships) and design-build-operate-maintain-finance. Nonetheless, the Committee has been studying the New York City Educational Construction Fund (ECF), a unique public private partnership model, as a potential model for legislative expansion.⁵¹ New York amended the Education Law in 1966, to create the ECF, as a mechanism to increase the production of elementary and secondary school facilities on land located in New York City, within the envelope of a larger compatible mixed use (residential, multi-family and/or commercial) "combined occupancy structure", thus permitting optimal and appropriate use of available land, including previously underutilized City-owned property.⁵² Although not restricted to City-owned land, the typical ECF project has been developed on either vacant or school-occupied property owned by the City, in order to capture and utilize the value of previously underutilized land. The ECF is a carefully targeted public-private partnership model to "encourage the investment of private capital in such combined occupancy structures and enable the construction of additional school facilities within existing financial limitations through the utilization of incidental revenue produced thereby . . . " ⁵³ A public benefit corporation jointly controlled jointly by the City's Board of Education⁵⁴ and the New York City mayor, the ECF is authorized to issue its tax-exempt bonds to finance the construction of the school facility portion of a combined occupancy structure. The non-school portion is financed (usually privately) by the developer, to whom the ECF leases or otherwise transfers the development rights necessary to permit construction of the larger non-school structure. The ECF bonds are secured by the City's space lease obligations to the ECF and the developer's ground lease obligations, which can cover, in whole or in part, the City's rental obligations to the ECF. The City typically pays a nominal rental amount for the school facility, particularly if the rental from the non-school portion is sufficient to cover the debt service on the bonds issued for the project.

One benefit of the ECF model in the school capacity setting is that it can help to mitigate unavoidable limitations in educational facilities capacity forecasting. Even if the City were to maximize the accuracy of its forecasting techniques and the effectiveness of its long-term planning processes,⁵⁵ there will always be the potential of a mismatch between actual physical plant and program needs, especially in a jurisdiction as large and as dynamic as New York City, a mismatch that the ECF model can provide assistance in solving. In view of the close connection to school capacity needs and new residential development the ECF model is a good tool to reduce the mismatch due to residential development. The ECF model has other advantages for development of schools and non-school facilities as compared to the traditional segregated model. First, the use of otherwise unused City-owned development rights – particularly on a leasehold basis – allows the City to capture value that would otherwise remain dormant. Aside from the value of the development rights being leased, it also provides tax revenue on what would otherwise be exempt property, through tax equivalency payments by the developer. In addition, provided the income generated from the non-school portion is sufficient to cover the debt service on the ECF-issued bonds, the City is able to build new, state-of-the-art schools outside of its capital budget, simply allowing more schools to be built. On the developer side, the ability to avoid up-front acquisition costs provides greater access to and flexibility for financing. This, in turn, increases the viability of projects that would otherwise be unsustainable in a given location. This reduced financing burden also allows ECF and the developer greater flexibility to include affordable housing components without disrupting the financial viability of the project.

Thus, this Committee recommends the State consider authorizing the use of the ECF model for all its school districts. While few school districts have issues of density and scarcity of land at the magnitude that New York City does, the ability of the model to exact payments in lieu of taxes on tax exempt property would benefit certain jurisdictions. Allowing a private developer to avoid up-front land acquisition costs would also enable ancillary and supportive development that would otherwise not be financially supportable. Moreover, an ECF model based on government- or privately-owned property is consistent with current urban *and* suburban planning objectives of reducing sprawl and carbon footprints. In view of the qualities that education, healthcare and housing share—they are goods or services that require public subsidies to generate produce socially acceptable levels of their production,⁵⁶ the State should also consider the extent to which the ECF model could be modified to increase the production of healthcare and housing facilities. Since ambulatory health care clinics can occupy the same ratio to a mixed used building as school facilities do, the ECF model could be expanded to apply to the development and financing of public health care delivery sites in local communities away from tertiary care sites as the current regulatory framework demands. Since the standard “separation of uses” zoning model is no longer considered the best practice in land use

planning, especially in denser urban environments, combining housing with mixed use facilities that include light manufacturing as well as other commercial uses, with the employment potential might serve as an experimental use of the ECF model to increase the production of affordable housing within a community.

¹ Report on Alternate Methods of Public Works Procurement (2003 Report) (<http://www.nycbar.org/pdf/report/Construction%20-%20AlternateMethodsOfPublicWorksProcurement.pdf>); 21st Century Construction, 20th Century Construction Law (2008 Report) (<http://www.nycbar.org/pdf/report/ConstructionLaw.pdf>); Modernizing Public Construction Procurement for New York's Public Owners—If Not Now, When? (2009 Comments) (http://www.nycbar.org/pdf/report/Response_SAM.pdf); and 21st Century Construction, 20th Century Construction Law; 2011 Update (2011 Report) (<http://www.nycbar.org/pdf/report/uploads/20072050-21stCentConstruction20thCentConstructionLawUpdated.pdf>). These documents are collectively referred to as the “our earlier Reports”.

² Multiple prime contracting is a technical/functional term for what people in New York refer to as the Wicks Law.

³ State and local governments and their associated authorities are creations of State law and, in their role of owner, they can use only those service delivery methodologies authorized by the State. This Committee explained that “[t]he public construction procurement statutes in New York, enacted in the last century, reflect the dominant mode of construction at that time, as did the statutes of most other states. This traditional service delivery methodology consists of a public solicitation using what are termed final drawings and specifications and selection methodology mandating the award to the bidder proposing the lowest initial cost to construct (the “public design-bid-build methodology”). Complicating prior attempts to move away from the public design-bid-build methodology is the fact that the methodology is embedded in a series of laws that were enacted, or were perceived to have been enacted, in response to earlier instances of corruption in public works. In particular, this scheme reflects a strong bias against negotiation as a way to obtain the best value for construction services and products, despite evidence that this mandated methodology no longer insures either the best work or the lowest combination of initial and life-cycle costs.” 2011 Update, p.6.

⁴ 2008 Report, p. 2.

⁵ At the time of this report, the statutes surveyed in the initial phase of this analysis include the State Finance, Insurance, General Municipal, Education, Highway, Public Buildings, Labor, Public Lands, General Business and Lien Laws.

⁶ 2011 Report, p. 6.

⁷ 2011 Report, p. 11.

⁸ This line of reasoning assumes that no public owner would relinquish the tax-exempt interest rate on bonds, which is typically lower than the private cost of capital, to finance projects, so that most public private partnerships would take the form of design-build-operate-maintain, with public finance on a mixed tax-exempt and taxable basis. 2011 Report, p. 8.

⁹ 2011 Report, p. 9.

¹⁰ 2011 Report, pp.9-10.

¹¹ S. 50002, 2011 General Assembly, Extraordinary Session (N.Y. 2011).

¹² The New York State Thruway Authority, State Department of Transportation, Office of Parks, Recreation and Historic Preservation, State Department of Environmental Conservation and New York State Bridge Authority.

¹³ Proposed amendment of the Infrastructure Investment Act in the 2014 Executive Budget at <http://publications.budget.ny.gov/eBudget1415/fy1415artVIIbills/TEDArticleVII.pdf>. [Part B, beginning on page 11

of the document] Cities, towns and villages with populations of 50,000 or less are excluded from this authorization. Public works projects can be excluded from the adverse impacts of the State's multiple prime contracting requirement because, as with some horizontal infrastructure projects, there are no applicable multiple prime elements. In addition, amendments to the State's multiple prime contracting law raised the dollar value to which the law applies and also permitted public owners to avoid it if they entered into a project labor agreement. See 2008 Report, p. 9.

¹⁴ See Barry B. LePatner, Esq., *Technology and the Industry That Time Forgot* at <http://www.barrylepatner.com/documents/TechandtheIndustrythatTimeForgot.pdf>.

¹⁵ Contrast the discussion of the construction-manager-at-risk methodology, which, although a variety of design-bid-build, does permit the identification and participation of the constructor during the design phase, thus permitting some of the same types of cost avoidance as design-build does.

¹⁶ John Lord and John Rapaport, "Harmonizing BIM: The Value of Multi-Disciplinary/Multi-Dimensional Participation in the Model," *Journal of the National Institute of Building Sciences*, October 2013, pp. 32-34, at <http://www.journalofthenationalinstituteofbuildingsciences.com/2013/October/files/32.html>. This data can include the various cost estimates made during the design phase, actual cost data from contractors and subcontractors, and the owner's operations and maintenance cost data during the project life. For this data to be available for enterprise management purposes (such as return on investment analyses) and public policy purposes (such as evaluation of the alignment of built environment regulatory intent and actual impact), it will be necessary for construction industry stakeholder participants to resolve technical issues such as interoperability and open standards among the various BIM programs or, perhaps, for large public owners to mandate the use of interoperable programs by their designers, general and prime contractors, and their subcontractors.

¹⁷ Terri Matthews, "Modernizing Built Environment Law", Albany Government Review, Vol. 6, Issue 1 (2013), pp. 171-178.

¹⁸ The reference to the multiple prime requirement in the proposed legislation has the effect of limiting the use of design-build for horizontal projects unless they are below the dollar value to which the multiple prime requirement applies or there is an applicable project labor agreement. There appear to be conventional preferences in practice for design-build on horizontal infrastructure projects and for CM@Risk on vertical projects. While Massachusetts' statutory scheme follows conventional preferences by limiting design-build to horizontal structures and CM@Risk to vertical structures, the MCPPI does not—its broad authorization of all service delivery methodologies leaves it up to the discretion of the public owner to decide what service delivery methodology makes sense for the particular project at hand.

¹⁹ 2008 Report, p. 24 (endnote 5). Multiple prime contracting is a contractual variation of design-bid-build. While most states permit multiple prime contracting, New York State was, as of 2003, one of a handful of states that *mandate* it on public construction projects. When the Wicks Law was originally enacted in 1909, not only was design-bid-build the only methodology for construction and constructed infrastructure and buildings much less complex than they are today, but also multiple prime contracting, which is technically compatible with such delivery method, was also considered somewhat of an innovative practice, permitting the owner the flexibility to facilitate 'fast tracking' because the tool gives *the owner* the ability to award individual contracts "as soon as [a] respective aspect of design is complete, giving the owner more control over project schedule because owner can set bidding schedule and avoiding contractor mark up because the owner can directly procure major material items." For multiple prime contracting to work well for the benefit of the owner and its project, the owner must have the internal capacity to manage, as a general contractor does, the separate contractor entities with which it has contract privity or it must have the financial resources to hire a construction manager, as its agent, to manage those contractors. The problem with mandatory multiple prime contracting in New York is that it "forces public owners to use the multiple prime contracting tool, regardless of its internal competencies and capacities and financial resources, increasing the risk of delay and added costs, in a budget environment of limited resources and increasing needs." 2008 Report, pp. 4, 7 and 24 (endnotes 5 and 6).

²⁰ Glenn Ballard and Greg Howell, "What Kind of Production Is Construction?", Proceedings IGLC '98 Guaruja, Brazil, p. 5. Building design can be functionally conceived as "a flow of information and materials (flow process) and as the generation of value for customers" in the context of "converting inputs to outputs (conversion process)." (*Idem*) "Value is generated through a process of negotiation between customer ends and means. The first role of the designer is to make explicit to customers the consequences of their desires, subsequent to which customers may choose to modify their ends." (*Idem*) The design-build paradigm, aided by BIM technology which can greatly facilitate the flow process, is the context within which designers, constructors **and** the owner-customer can operate in a "social unity" on the design and production of a built artifact. (Ballard and Howell, *op. cit.*, p. 7.)

²¹ *Idem*; see also John B. Miller, "Life Cycle Delivery of Public Infrastructure: Precedents and Opportunities for the Commonwealth" (Boston: Pioneer Institute December 2008), No. 44. p. 6.

²² 2011 Report, p. 14 (footnote 36).

²³ Matthews, *op. cit.*, p. 164, citing Jean-Etienne de Bettignies and Thomas Ross, "The Economics of Public-Private Partnerships, 30 Canadian Public Policy (2004), p.135.

²⁴ *Idem*, citing de Bettignies and Ross, *op. cit.*, pp. 145-146. New York's public construction procurement laws not only reflect an archaic view of construction, but also reflect a judgment that the constructor does not exercise a sufficient level of skill and judgment, as other professionals do, necessary to move the selection criteria from that of pure price to that, like in the publicly-funded human services or the construction consultant services context, of a range of criteria of which price is but one. The State's home rule paradigm further enforces this judgment by permitting local governments to regulate for the competence of some constructor participants and to regulate some constructor entities as businesses, while increasing the regulatory complexity of the fragmented construction industry within the State. See Matter of AAA Carting & Rubbish Removal, Inc. v. Town of Southeast, 17 N.Y.3d 136 (2011), as an example of how New York courts do not extend the special skills and judgment exception to construction, which is viewed as the essential core of what is "public work" under General Municipal Law, Section 103 (GML 103). For the "special skills exception" to lowest competitive bid for professional services, the courts must be able to find that such contracts are neither public work nor a "purchase contract" within the meaning of GML 103.

²⁵ Mass. General Laws, Chapter 149A.

²⁶ Office of the Inspector General, *Experience of Massachusetts Public Agencies with Construction Management at Risk under M.G.L. c. 149A*, October 2009, p. 12.

²⁷ *Ibid.*, p. 57.

²⁸ *Ibid.*, pp. 50-51.

²⁹ *Ibid.*, p. 32.

³⁰ Matthews, *op. cit.*, pp. 171-178, citing to Miller, *op. cit.*, p. 27.

³¹ It is expected that the increasingly widespread adoption of building information modeling (BIM) technology across the industry will likely to follow the pattern, 30 years ago, of computer-assisted design's adoption and eventual acceptance as the standard of practice.

³² Education Law § 6504, Regulation of the Professions [establishing the supervision of the Board of Regents and the administration of the Education Department]. See also Education Law, Article 145, §§ 7200-7212, Engineering and Land Surveying, and Article 147, §§ 7300-7308, Architecture.

³³ See 2008 Report, page 31(endnote 59), summarizing findings from Michael K. Love and Douglas L. Patin, eds, State Public Construction Law Sourcebook (Chicago: CCH Inc. 2002).

³⁴ See, e.g., Education Law Section 6506(9) [authorizing the Board of Regents to establish rule on fee splitting], Section 6509(2) [defining professional misconduct as fraudulent practice or beyond authorized scope], Section 6509(7) [defining professional misconduct as aiding or abetting an unlicensed person to perform activities requiring a license], Section 6509(9) [committing unprofessional conduct as defined in rules or regulations] and

Section 7210(1) [authorizing professional corporations and certain grandfathered corporations to offer professional engineering services only upon receiving certificate of authorization from Department]. *See also*, 8 NYCRR § 29.3(6) [prohibiting sharing of fees between design professionals and most non-licensed persons]. Moreover, the Department’s website states that non-licensed entities may not subcontract professional engineering or land surveying services. *See* “Frequently Asked Practice Questions”, available at <http://www.op.nysed.gov/prof/pels/pefaq.htm> [the answer to question No. 12 states “An entity not authorized to provide professional engineering and/or land surveying services, such as a general contractor, cannot subcontract with a licensed professional engineer or land surveyor in order to provide professional services to a third party client”].

³⁵ Claude Charlebois et al. v. J.M. Weller Assocs., Inc., 136 A.D.2d 214, 218 (3d Dept, 1988), *aff’d* 72 N.Y.2d 587 (1988) [affirming lower courts]. Contractor did not violate the New York Education Law by obligating itself to perform both the design and construction services, but that was only because the contract specifically required the contractor to enter into a separate contract for design services. It did not matter that the owner of the contracting firm was also the owner of the engineering firm that the contractor hired, so that contractor was essentially hiring itself to perform the design work.

³⁶ *See, e.g.*, Charlebois at note 25, SKR Design Group, Inc. v. Yonehama, Inc., 230 A.D.2d 533 (1st Dept. 1997), Cherokee Owners Corp. v. DNA Contracting, LLC, et al., 74 A.D.3d 411 (1st Dept. 2012), Mclver-Morgan, Inc. v. Dal Piaz, et al., 108 A.D.3d 47 (1st Dept. 2013).

³⁷ *See Charlebois* at note 25, General Building Contractors of New York State, Inc. v. New York State Education Dept., et al., 175 Misc.2d 922, 927-928 (1997) [NYSEd promulgation of delegation exception rule did not create unlicensed oversight, citing Charlebois]; Education Law § 7202 [only licensed persons shall practice engineering]. In view of the increasing presence of construction management programs and the professionalization within the constructor fields, the State should consider joining the several jurisdictions that license certain constructor participants as professionals. A number of states require significant state level licensure contractors such as Alabama, Alaska, Arkansas, Arizona, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Massachusetts, Minnesota, Mississippi, North Carolina, North Dakota, New Mexico, Nevada, Oregon, Tennessee, Utah and Virginia.

³⁷ 8 NYCRR 29.3(b), § 7302 [only licensed persons shall practice architecture].

³⁸ 8 NYCRR 29.3(b), § 7302 [only licensed persons shall practice architecture].

³⁹ Anne-Mette E. Andersen, “The Illegal Practice of Engineering or Architecture by Companies in New York – A Compliance Guide [Part Two]”, *Bloomberg Law Reports* (2010), p. 8.

⁴⁰ As with any change, those who understand and work well under a set of relationships perceive a potential for reduction in the span of control. Even in a design-bid-build process, however, an architect’s control of the design space is illusory since the project owner’s financial resources have always provided, regardless of the delivery methodology, a finite envelope for the owner’s needs and desires for the project as well as the specific requirements of the project site. Yet it is necessary to confront the perception of design control lost via a change in service delivery methodology from design-bid-build to design-build. Instead of losing control of the design space in the move to design-build, the designer can experience an increase in controlled design space as more previously down-the-line construction/production information enters the design space, information that can inform the design as early as possible when change is relatively costless. The experience of aerospace designers after the introduction of parametric solid modeling (a forerunner to BIM) and multidisciplinary design optimization (MDO), an analog to design-build and principles of integrated project delivery) demonstrates a paradox of control when the “[e]arlier integration of MDO increases the time in conceptual and preliminary design to ‘capture more knowledge,’ and ‘retain[s] more design freedom later into the process in order to act on the new knowledge gained by analysis, experimentation and human reasoning.’” *See Matthews, op. cit.*, pp. 165-167.

⁴¹ In the public debate during moments of reform, issues of public safety arise when it is sometimes asserted that licensed designers in control of the design-build process are necessary to stand between project safety and disaster. We believe these assertions are baseless because they assume that an in-house licensed professional will protect the public less than an independently retained licensed professional. To use an analogy, we are unaware

of evidence that in-house counsel complies with professional responsibilities any less than outside counsel, especially in assuring that his or her client complies with the laws—the licensing laws seek to protect the public from dishonest or incompetent professionals and the contractual relationship between counsel and client is not an issue for lawyers as it appears to be for architects and engineers. Moreover, State governments license architects and engineers, among other professionals, in order to protect the public from incompetent professionals by mandating a level of professional competence, evidenced primarily by academic requirements and testing, as a condition of conducting business in the state. Protecting public safety is also a public purpose justifying licensing and the licensing of designers is but one of the many areas where government, as regulator, adopts laws and regulations to assure public safety in the built environment. The existence of building safety codes, with component sub-codes, worker safety laws and regulations, professional licensing requirements as well as non-professional licensing requirements, and government inspections of work certified by professionals and others, creates redundancy and means that there is no one guarantor of public safety. Government has put in place an entire system, with multiple redundancies due to different levels of government regulating the same built thing, process or participant, to increase the likelihood that both the construction process and the constructed thing do not pose danger to the public.

⁴² See 2011 Report, p. 21.

⁴³ See 2011 Report, pp. 31-33.

⁴⁴ MCPIP § 3-401.

⁴⁵ See 2011 Report, p. 35.

⁴⁶ See, e.g., Mass. General Laws, Chapter 149A requirement of an Owner's Project Manager, who is a professional designer with required levels of experience, hired before the project designer to serve as the public owner's agent and consultant throughout planning, design, procurement and construction, including providing advice on selection of designer, design, value engineering, scope, estimating, general and subcontractor pre-qualification and selection, scheduling and construction.

⁴⁷ The history of design-build is replete with an alphabet soup list of marketed contract products purporting to be the solution for what ails the construction industry.

⁴⁸ See Roberto Mangabeira Unger, *The Critical Legal Studies Movement* (Cambridge: Harvard University Press 1986), pp. 66-90.

⁴⁹ One example of a data-driven management tool that supports and is supported by BIM technology is earned value management, which utilizes data from the contractor and sub-contractor levels for both macro- and micro-level analyses.

⁵⁰ In this instance, the standard contracts produced by various archetypal participants—e.g., AIA and Consensus—can serve as examples for drafters who draft their own contracts to serve project and owner needs while allocating risks to those parties that can control for them while taking care to eliminate adversarial and counter-productive risk shifting.

⁵¹ See the City University Construction Fund and the State University Construction Fund, Education Law, Art. 125-B, and Art. 8-A. See also Education Law, Art. 10-B for City of Yonkers Educational Construction Fund.

⁵² Education Law, Art. 10.

⁵³ Education Law, Section 451.

⁵⁴ Currently called the Department of Education.

⁵⁵ See Office of New York City Comptroller, *Growing Pains: Reforming Department of Education Capital Planning to Keep Pace with New York City's Residential Construction*, pp. 6-8.

⁵⁶ See 2008 Report, p. 9 and p. 30 (end notes 54 and 54).

The Construction Law Committee

of

The Association of the Bar

of

The City of New York

**21st Century Construction
20th Century Construction Law**

February, 2008

21st Century Construction 20th Century Construction Law

Executive Summary

- The Construction Law Committee, like other Committees before it, believes that mandatory multiple prime contracting has no place in modern public construction and that the entire statutory scheme for public procurement must be overhauled to promote flexibility and innovation and reflect contemporary trends in service delivery methodology.
- This Committee, however, further believes the State must engage in a rigorous review of the entire statutory scheme for construction and its products, both publicly and privately financed, to bring New York's construction industry into the 21st century, unleashing its economic potential.
- In view of the changed political landscape, evidenced by the proposed amendments to the Wicks Law, the Construction Law Committee urges the State Legislature and the Governor to convene a multi-disciplinary, professionalized task force to study entire statutory scheme covering construction in New York with a view to proposing reforms to help make the industry more efficient for the benefit of the State and local economies.
- This report initially summarizes areas untouched by the proposed amendments to the Wicks Bill that create opportunities for reform and increased efficiencies. The objectives sought by New York's construction laws, many adopted long before the end of the last century, are valid and worthwhile. Well-intentioned provisions unexamined over time, however, can have unintended, and unaffordable, negative economic consequences.
- The following section describes the close relation of the construction industry to the economy and how the various roles of government give rise to opportunities for the State to increase the efficiency of the construction industry as one way to increase the efficiency of the State and local economies. The fragmented nature of the construction industry makes government action a necessary condition for significant improvement.
- Committee observations, both past and present, accompany descriptions of the provisions of the proposed Wicks Law reform in the third section. What was true in 1986, when the Municipal Law Committee noted that "[t]he construction industry has changed dramatically in the past sixty-five years," is truer still today, some 22 years later.
- The State of New York, in its economic policy role, should strive to permit the State *and* its local governments, in their role as owner and client, to have flexibility in deciding, like private owners, what service delivery method is

appropriate for their various capital projects. Public procurement law is not an efficient tool for regulating the economics of the industry, and the fourth section discusses possible public procurement reforms beyond the proposed reform of the Wicks Law. As a model for change in this area, the Construction Law Committee suggests review and consideration of the 2000 Update to the American Bar Association's Model Procurement Code.

- The construction industry is an important component of overall economic performance and competitiveness, and appropriate governmental intervention can help to increase its efficiency, as discussed in the final section. Achieving the greatest possible level of efficiency will require review and reform of all regulations affecting construction industry performance. To that end, the Construction Law Committee suggests consideration of the recent approach taken in Great Britain.

21st Century Construction 20th Century Construction Law

Untapped Opportunities for Economic Growth Beyond Wicks Bill. The Governor's 2007 Program Bill 37 R-1, which initially sought to raise the threshold amount triggering the application of the Wicks Law,¹ was introduced in the Senate and the Assembly on April 26, 2007. On June 14, 2007, the Governor, the Assembly Speaker and the Senate Majority Leader announced an agreement to amend Wicks Law provisions (the "Wicks Bill").² While the Assembly passed the Wicks Bill, the Senate did not.³ Part of the Governor's 2008 program legislation, introduced in the Senate and the Assembly on January 22, 2008, repeats the elements the Wicks Bill and adds other provisions collectively aimed at facilitating "local government cost saving efforts by providing relief from certain State mandates."⁴ The State's multiple prime contractor requirement,⁵ a variation of the design-bid-build service delivery model, is one part of an overall set of procurement procedures for public construction projects that is old and inflexible, inefficient and costly, and that often fails to meet the needs of the construction projects themselves and their public owners. While most states permit multiple prime contractor bidding, New York State is one of a handful of states that mandate such bidding on public works.⁶

Public procurement accounts for such a large proportion of the total work of the construction industry⁷ that it is understandable to focus initially on reforming public procurement to fix what many think is wrong with the construction industry and unleash its potential economic activity and growth. As a reform of a small, but counterproductive, part of the public procurement process, the Wicks Bill represents advancement in the right direction.⁸ Within the context of public construction, however, the State must do more for itself and its localities to make public capital programs more efficient, especially when economic forecasts forecast lower revenues and recent infrastructure assessments forecast increased capital needs.⁹ Broader and deeper reform of the public procurement processes would enable the State and its localities to avoid future costs related to construction delays and inefficiencies now caused by such processes. They would thus be able to stretch available resources to meet capital needs and reduce pressure on long-term sources of revenue, such as real property taxes, used to pay the debt that finances project costs. The Wicks Bill is a good starting point for broader and deeper reform of the entire public procurement statutory scheme. As described in further detail in this report, the 2000 Update to Model Procurement Code¹⁰ provides an approach we suggest the Legislature and Governor review to deepen reform of the statutory scheme for public procurement of construction. A summary of the 2000 Update is included in Appendix A.

Without minimizing the impact of the State's antiquated public procurement scheme on the economy, there is, however, more to the statutory scheme for the construction industry than public procurement alone. The State and its local governments regulate construction industry participants and the products of construction for various public policy objectives including occupational and public safety concerns, environmental impacts, professional and trade standards and

licensing, business qualifications, and insurance requirements. In view of the close connection among the construction industry, its products and the economy, *all* laws and regulations—whether State or local—that govern both public and private construction participants and products present rich opportunities for the State to improve the productivity of the construction industry in New York to benefit the State's economy and competitive position, and those of the regions within it.¹¹ Per-worker productivity within the nation's construction industry has been declining since 1964, in contrast to the aggregate industrial productivity increase.¹² Government intervention may reduce or remove many suspected causes of this decrease in productivity. As described in further detail in this report, the British have been engaged in a multi-disciplinary review, which includes economic analysis, of the construction industry and its products. This experience provides an approach, as well as a treasure trove of analytical work, that we suggest the Legislature and Governor review to commence reform of the construction industry in New York.¹³ A summary of the British approach is included in Appendix B.

The political pragmatism reflected in the Wicks Bill suggests that the political landscape has changed sufficiently to support a long-needed high-level analysis of the economic potential of the construction industry locked within the statutory scheme that governs it. Having waited until now to undertake such a review may actually increase its chances of ultimate success in supporting reform of the entire statutory scheme to reflect 21st century realities. The Wicks Law has long been the poster child for inefficiency in public works procurement,¹⁴ generating such conflict among stakeholders that any discussion about such reform has precluded any discussion about broader reform. The agreement reached last summer may indicate a reduction in the level of conflict since 1994, the last time serious legislation on the Wicks Law was pending, which offers a good opportunity to achieve broader reform as stakeholders are more open to policy analysis and may be more willing to shift positions on the basis of analysis.¹⁵ In addition, moderate levels of agreement on analytical theory, technique and data since 1994 also increase the likelihood of generating feasible options grounded in quantitative analysis.¹⁶

New York State, in its various roles of "client, regulator, policy-maker and a sponsor of change,"¹⁷ has the opportunity, and obligation, to lead the nation by reforming its construction law. "[T]he sheer scale of the problems to be resolved" cannot be underestimated as another factor prohibiting a comprehensive review of the statutory scheme related to construction, despite its close connection to the economy.¹⁸ But what was true in 1986, when the Municipal Law Committee noted that "[t]he construction industry has changed dramatically in the past sixty-five years," is truer still today, some 22 years later. Regardless of whether the Wicks Bill provisions are adopted in 2008, we strongly recommend that the Governor and the Legislature establish a non-partisan professionalized task force¹⁹ to expand the scope of their initial inquiry beyond the Wicks Bill and use tools of economic analysis, among those of other disciplines, to reform the entire statutory scheme for construction and bring New York's construction industry into the 21st century, unleashing needed economic potential. The objectives sought by New York's construction laws, many adopted long

before the end of the last century,²⁰ are valid and worthwhile. Well-intentioned provisions unexamined over time, however, can have unintended, and unaffordable, negative economic consequences.

Construction and the Economy. The construction process, its inputs and its products are not solely the subject of legal analysis. The construction industry ". . . makes an important contribution to a country's economic, social and environmental well being," topics well suited to a broad analytical review, so that a prospective legislative framework can increase productive economic efficiency.²¹ Not only does the construction industry, however defined, directly contribute to the State's economy and its gross state product,²² but its processes, employees and products also provide an additional secondary economic impact. For a sense of magnitude, in 2006, according to the U.S. Bureau of Economic Analysis, the output of the construction industry represented approximately 3.1 percent of New York's gross state product. The secondary impact of construction activity on an economy, termed the "multiplier effect", is the positive increase in an economy's income due to the related increase in expenditure.²³ General economic conditions determine the demand for construction services,²⁴ and fluctuations in the performance of both the general economy and the construction industry share a similar pattern.²⁵ Thus, legislative changes affecting construction have the potential to impact positively, if thoughtfully analyzed, the future of the State's long-term economic condition and industrial competitiveness,²⁶ as well as those of its local governments, all of which are currently concerns of both the Governor and the Legislature.

As discussed in greater detail below, the various roles of State government give rise to many points of opportunity to increase the efficiency of the construction industry as one way to increase the efficiency of the State and local economies.²⁷ For example, to the extent the State's public construction laws limit the efficient provision of social goods through the State and local public works programs, government cannot use its own public capital funds efficiently. As a general matter, government leadership and intervention is necessary to unleash the economic potential within the construction industry due to its particular nature as a fragmented industry.²⁸ Similarly, to the extent that unexamined State and local government regulations create regulatory complexities that operate as inadvertent barriers to effective competition in an already fragmented construction market, they unnecessarily limit the positive impact of construction on the economy. Existing traditional health and safety regulations of the industry and its products present opportunities for government to calibrate regulations aimed at what economists term "externalities" while increasing economic efficiency. Recent developments in the way we understand environmental impacts of construction and its products, as well as the way we understand the impact of design quality on the built environment, provide additional opportunities.

The fragmented nature of the construction industry makes government sponsorship a necessary condition for significant improvement.²⁹ Since positive change is unlikely in the absence of government intervention, it is important to identify the most effective level of government to undertake this effort. In New York, the state level may be the

most appropriate and effective level of government to effect reform of the construction industry and its products to maximize economic effect. From a legal perspective, in states where municipal home rule is either not allowed or, as in the case of New York, not particularly effective, it is necessary for the State to act on behalf of its localities in certain areas, such as, in particular, reforming public procurement.³⁰ From an economic perspective, the span of government action should correlate with the physical or spatial dimensions of the positive and negative externalities emanating from the private activities it seeks to correct.³¹ And, as described in greater detail below, only the State can properly evaluate and mitigate the complexities generated by the various local regulations on the construction industry and products, especially those that contribute to the fragmentation of the industry itself.

Commentary on Proposed 2007 Changes to the Wicks Law. After reviewing the Wicks Bill, this Construction Law Committee shares concerns similar to those expressed in the past by the 1986 Municipal Law Committee and the 1994 Construction Law Committee. The Wicks Bill minimizes some of the inefficiencies that come from the Wicks Law, one small part of the larger statutory scheme that covers construction in New York, but does not repeal the multiple prime contractor requirement. The Committee on Municipal Affairs, in 1986, supported the then governor's proposed legislation that would have largely, though not entirely, eliminated Wicks Law requirements. The title of its report, "The Wicks Law: Repeal it Now," suggests the preference of that Committee. In 1994, eight years later, three bills were pending in Albany, in the context of the statutory expiration of the New York City School Construction Authority's exemption from the Wicks Law, all of which fell short of complete repeal. The 1994 Construction Law Committee, as befitting its specialization, expressly identified, as the optimal legislative solution, in addition to repealing the Wicks Law, increasing the ability of public owners to match procurement or "service delivery" methods to actual project construction needs.³² The Committee noted "that no single superior procurement method exists, but rather several alternate techniques can be used . . . to optimize [the] chances of successfully obtaining new construction."³³

By 1994, if not before, multiple prime contracting had lost favor as tool within the building industry because the owner's need to coordinate the prime contractors significantly increases the risk to a project's schedule and, thus, budget. The risk is exacerbated on projects where the owner does not have internal capacity, or the extra funds to procure outside services, to manage such coordination. This is often the case for public works programs. In New York, the Wicks Law forces public owners to use the multiple prime tool, regardless of internal competencies and capacities, increasing the risk of delay and added costs, in a budget environment of limited resources and increasing needs "to provide and maintain the infrastructure necessary to sustain our economy and permit economic growth."³⁴

The Wicks Bill would "recalibrate" the threshold amounts that require public owners to bid public works to four separate or "prime" contractors for the following trades—

general construction, plumbing, electrical and heating, ventilation and air conditioning. The current threshold of \$50,000 applies to all State and local government contracts and was itself a recalibration from 1921, when the Wicks Law was first enacted. The proposed thresholds are: \$500,000 for all upstate counties, \$1,500,000 for Nassau, Suffolk and Westchester Counties and \$3,000,000 for New York City³⁵ and are intended to reflect changes in the economy since 1961 and 1964, when they were last adjusted. It is suggested that the lag in adjustment since the 1960s and rising costs of construction and real estate have subjected a larger proportion of projects to the Wicks Law requirements than had been the case when the law was originally adopted and over 40 years ago when it was last adjusted. The 1994 Construction Law Committee deemed raising the threshold via an automatic indexing process an improvement to the then current environment, but noted this provision did nothing to improve procurement efficiency.³⁶

In addition to increasing the proportion of public works automatically exempt from the multiple prime contractor requirement, the Wicks Bill would also create a process for public owners to remove a project, not automatically exempt, from the multiple prime contractor requirement.³⁷ The proposed legislation first would specifically authorize project labor agreements³⁸ and then would authorize a public owner to determine that its interest in achieving expressed standard public procurement objectives is best met by requiring a project labor agreement.³⁹ Following such determination, the public owner would then be able to craft a solicitation for a single general contractor in the context of a mandatory project labor agreement. Any project thus exempt from the multiple prime contractor requirement would be deemed a public works project and subject to prevailing wage requirements, among others. Any contract⁴⁰ between the public owner and general contractor for an exempt project would need to conform to additional statutory provisions, such as those related to the public owner's review and approval responsibility for project, design and construction standards, payment and performance bonds, standards for selection of contractors and subcontractors, and apprentice training programs.

The exemption of a project from Wicks Law, either via the threshold provision or the project labor provision, would also remove one of two statutory impediments to public owners' use of a variety of construction management techniques.⁴¹ For all projects exempt from the Wicks Law requirements, the Wicks Bill would add a listing requirement, similar to those in effect in several other states,⁴² to protect subcontractors from "bid shopping" and "bid negotiation"⁴³ by the general contractor. It would require a single prime contractor to submit a separate sealed list naming each subcontractor and related subcontract price with its bid. Upon award to a single prime, the corresponding sealed list would be made public and effective. The single contractor would need to obtain permission from the public owner to change a listed subcontractor or an approved subcontract price based upon showing a "legitimate construction need for such change" which would include, among other things, changes to projects specifications and changes in construction materials costs.⁴⁴ The 1994 Construction Law Committee had surveyed New York case law, revealing a view of the marketplace where bid shopping and bid negotiation are legitimate activities, within

certain constraints. Prime contractors use the competitive marketplace to test for best possible prices, which ultimately benefits owners, both private and public. Under New York law, public owners themselves can also use the competitive marketplace to test for best value under certain circumstances and within certain limits.⁴⁵ This view is at odds with that of other jurisdictions, and the 1994 Committee identified several states, which provided statutory protection for subcontractors within a single prime environment.⁴⁶ While the Committee reiterated a legitimate basis for bid shopping and bid negotiation by public owners—namely, “achieving the most efficient possible procurement of construction”—it also found that “concern for the fairness of the process would justify some protection for subcontractors against these practices.”⁴⁷

The Wicks Bill would also provide additional protection for all subcontractors by tightening up the existing prompt payment rule, similar to those in several other states, by reducing the number of days, from 15 to seven days after receipt of payment from the public owner, within which the general contractor must pay the subcontractors and materialmen.⁴⁸ In addition, the Commissioner of Labor would have the power to enforce compliance with the Wicks Law by issuing a stop bid order whenever he determines that a public owner subject to the multiple prime contractor requirement has failed to prepare separate specifications.⁴⁹

Finally, in a provision conceptually unrelated to reform of multiple prime contracting, the Wicks Bill would authorize a pre-qualification procedure for local governments, which currently lack general state authorization for pre-qualification of public works contractors.⁵⁰ The benefits of pre-qualifying contractors, within the traditional design-bid-build model, include permitting the owner to consider qualifications, experience and past performance, in addition to price, thus increasing the chance that selected contractors are capable of providing quality construction.⁵¹ This proposed change is consistent with a small number of states that either require or permit pre-qualification of contractors prior to bidding.⁵²

Public Procurement Law and Government as Owner and Client. When assessing the role of government as an owner and client, it is sometimes difficult to disentangle this role from its concurrent and unique roles of economic policy maker and regulator. Government is an owner and client of construction services that implement its capital program. The public works or capital programs of all levels of government are, in essence, work orders for facilities relating to “social” or “public” goods and to “mixed goods” that correct for negative and positive externalities.⁵³ In addition, by allocating capital fund resources to public goods and mixed social goods, a unique function of government, the State and its local governments can produce economic efficiencies to help to stabilize the State and regional economies.⁵⁴ Government performs an active management role in the economy when it increases capital spending or strategically targets existing levels; it can also perform such role, when decreases in capital funds are likely, by reforming the existing statutory scheme, at existing or lower funding levels to increase productivity and efficiency.⁵⁵ When exercising its unique policy and regulatory roles, however, government often enacts laws and

regulations at odds with its role as client and owner that can diminish its ability to efficiently exploit capital programs as economic tools.

New York, in its economic policy role, should strive to permit the State and its local governments, in their role as owner and client, to have flexibility in deciding, like private owners, what service delivery method is appropriate for its various capital projects. The procurement process is not the most effective way of achieving economic, or other, policy ends related to the construction industry.⁵⁶ In its role as client, government, like all owners, is concerned with budget, schedule, safety and quality, or value.⁵⁷ Government as client, like all owners, should be open to innovative ways to increase the chances of aligning its interests in budget, schedule, safety and quality with the interests of its agents in construction, especially since the construction milieu is the very definition of asymmetric information, which is "a situation where two parties to a transaction involving a good or service have unequal knowledge of the properties or risks involved in making that transaction."⁵⁸ Instead of increasing the alignment, however, government often establishes procurement schemes for itself that limit how it obtains construction related services due to other public policy concerns, such as transparency and fairness, which are of less concern to private owners. Examples of limits government imposes upon itself, that tend to make effective principal-agent alignment less likely, are public competitive bid requirements, awards to the lowest responsive bidder with little discretion to take other factors into account, requirements that bidding documents contain detailed plans and specifications prepared by professional designers and multiple prime bidding requirements, such as the Wicks Law.

While New York is among the few states with a mandatory multiple prime contractor requirement, it is in good company across the nation among states that limit state agencies and/or local governments to use only the traditional design-bid-build method of construction service delivery, primarily or exclusively via the open, publicly-noticed competitive bid process with award to the lowest responsible and responsive bidder.⁵⁹ Several states, however, many of which have adopted the 1979 Model Procurement Code, permit public owners procurement flexibility to match project needs, primarily because they permit competitive sealed proposals, or requests for proposals for construction services with an ability to negotiate with the bidders or to award based on best value.⁶⁰ A few other states, which have not adopted the 1979 Model Procurement Code, nonetheless permit public owners to exercise flexibility to match service delivery to project needs via a menu of options, much in the manner found in the recent 2000 Model Procurement Code. The various options include alternatives to the traditional design-bid-build delivery method, such as design-build, construction-manager-at-risk, and alternative methods with approval.⁶¹ The recent 2000 Model Procurement Code updates the 1979 Model Procurement Code primarily to encourage the use of "new forms of project delivery in public procurement, especially in the construction area."⁶² For a more detailed description of the 2000 Model Procurement Code provisions related to construction, please see Appendix A.

Not only does the appropriate service delivery method vary with the project and the competencies of owner staff, but also the methods evolve with use over time. The best solution for the State and its local governments, especially as they are likely to enter a period of increasing budget constraints, is to permit them the flexibility to increase value in public works projects. Freedom to choose the appropriate service delivery method for projects, including the freedom to *choose multiple prime contracts when appropriate*, and the ability to innovate new service delivery methods in the future would give New York governments appropriate tools to increase public project value and make their capital programs as efficient as possible.⁶³

Government as Regulator and Promoter of Economic Efficiency. What has become, in Great Britain, a rich and broad endeavor, yielding, among other things, quantitative measures of design value and a process for using them, began with a simple economic proposition. The construction industry was too important to the economy for government to leave it alone.⁶⁴ With appropriate intervention to increase its efficiency and without increasing the level of resources committed to it, the industry could increase its productivity.⁶⁵ Given the proportion of government work within the construction industry, increasing the industry's efficiency requires reforming public procurement processes as described above. Achieving the greatest possible level of efficiency, however, requires review and reform of all regulations that affect the construction industry's performance on private and public projects. The relative costs and benefits of regulations change over time as the circumstances they cover change, and the State should periodically review them for opportunities to mitigate unnecessary or unintended drag on the economy. To make the construction industry more efficient in New York, the State should follow a multi-disciplinary approach to review and analysis, similar to the sustained approach taken in Great Britain since 1994, and also take advantage of, and build upon, conceptual and quantitative work produced as a result that work. Please see Appendix B for a more detailed description of the British experience.

Governmental legislation, directly regulating or indirectly affecting the industry, impacts both construction demand and supply, thus impacting the economy, due to the close connection between the economy and the construction industry.⁶⁶ Government regulates to correct for positive and negative externalities generated by the construction process and its products. For example, conventional regulation of construction seeks to reduce the incidence or scope of unsafe construction practices and products and to increase the incidence or scope of safer ones, at least to the extent the private marketplace produces socially unacceptable levels of either. Government also regulates the industry and its products with respect to its impact on the natural environment and on the built environment, both fields where understanding is changing rapidly.⁶⁷ There is always potential for the State to increase economic efficiencies by reviewing the more conventional examples of regulation of the construction industry, including occupational and public safety regulation, regulation of environmental impacts, professional and trade standards and licensing, business qualifications, and insurance requirements for both construction projects and participants.⁶⁸ Recent changing analyses on the long-term impacts of

construction and its products on the natural and built environments present additional opportunities for the State to further increase economic efficiencies.

To the extent that these unexamined State and local government regulations create regulatory complexity within fragmented markets, they may operate as inadvertent barriers to effective competition and may unnecessarily limit the positive impact of construction on the economy. It is the realistic possibility of competition from other markets that mitigates the negative impacts of these fragmented local markets.⁶⁹ In New York, only the highest level of government, the State, would have the interest, resources and authority for undertaking such review and for proposing changes, some of which might impact local practices. Statewide review of State and local regulations, *and* their interaction with each other and with the industry, may reveal unintended barriers to movement and entry among the fragmented markets. Reform of such regulations, thus, could increase economic efficiency and economic growth within the State.

The ABA 2000 Model Procurement Code

In 2000, the American Bar Association updated its 1979 Model Procurement Code (the "2000 Update"), among other reasons, to support "the new and different forms of project delivery for constructed facilities . . . , such as Design-Build, Design-Build-Operate, and Design-Build-Finance-Operate" made possible by the application, since 1979, of Computer Aided Design (CAD).⁷⁰ A specific goal of the 2000 Update was to encourage the use of "new forms of project delivery in public procurement, especially in the construction area."⁷¹ This Committee suggests the Governor and Legislature consider the 2000 Model Procurement Code's Article 5—Procurement of Infrastructure Facilities and Services—as the basis for modernizing New York's public construction law.

Article 5 authorizes and defines several methods of construction service delivery.⁷² All of these models depend upon "the prior establishment of functional requirements of a project."⁷³ These functional requirements, defined as "design requirements", must be included in the solicitation document⁷⁴ and include "features, functions, characteristics, qualities and properties that are required by the [State]; the anticipated schedule, including, as a minimum, start, duration, and completion; and estimated budgets (as applicable to the specific procurement) for design, construction, operation and maintenance."⁷⁵

The first method, design-bid-build, "is a proven, commonly used public procurement method throughout the United States that was previously authorized under the 1979 Code [and includes] a widely used variation known as construction management at risk."⁷⁶ The other methods consist of design-build, design-build-finance-operate-maintain and design-build-operate-maintain and are described further below. The traditional design-bid-build model, with its separation of design and construction, creates the potential for "disconnects" during the life of the project, a weakness that the alternative models address by requiring earlier integration of the work of design—architectural and engineering—with the realities of construction.⁷⁷ This arbitrary separation appears at odds with converging trends in the various and conceptually related design management techniques⁷⁸ that advocate the earliest possible application of techniques aimed at the fullest expression of project scope by the largest number of stakeholders in the most integrated possible manner.⁷⁹

Early integrated application of these techniques in a design-bid-built context can help to mitigate the "disconnects" arising from the separation between the designer and the constructor.⁸⁰ In the public sector, however, the arbitrary separation can become a legal one that precludes, or makes more difficult and costly, meaningful contractor involvement during the design phase to facilitate optimum project scoping and constructability analysis before construction. Early integration of design work with construction is required, however, in the following service delivery methods authorized in the 2000 Update described below:

- In *design-build*, the public owner "enters into a single contract for design and construction of an infrastructure facility," which "is a productive, competitive alternative to design-bid-build and construction management at risk when the government has established the functional requirements (design criteria) of a project."⁸¹
- In *design-build-finance-operate-maintain*, the public owner "enters into a single contract for design, construction, finance, maintenance and operation of an infrastructure facility over a contractually defined period."⁸² This model "is a proven delivery method in common use throughout the world and in American antiquity [that] integrates long-term operation and maintenance, as well as project finance, into a single competition."⁸³ The entire competitive bid, including the financing component, must assume there will be no government appropriations during the life of the contract, so that both the government and the private bidders must be assured the project can generate sufficient revenues to pay any debt issued to finance the project as well as the operation and maintenance expenses during the contract term, in addition to the design and construction costs.⁸⁴
- Like the others, a single contract marks the *design-build-operate-maintain* model, this time for design, construction, operation and management of the facility over the contract term.⁸⁵ Unlike *design-build-finance-operate-maintain*, however, the government may, through appropriations or fees, pay or secure the payment for all or a portion of the funds necessary for the contractor's services.⁸⁶

In a critical departure from the past statutory preference, which has favored publicly-noticed competitive sealed bidding for construction services awarded to the lowest responsible and responsive bidder, the 2000 Update specifically authorizes and requires that the *design-build*, *design-build-finance-operate-maintain* and *design-build-operate-maintain* methods described above use competitive sealed proposals instead.⁸⁷ While the kind of procurement flexibility provided above would be a necessary step in the right direction, a simple comparison of the traditional *design-bid-build* with the *design-build* service delivery models illustrates the trade-offs between the two methods, and suggests that, even with procurement flexibility permitted by statute, public owners may tend toward using the traditional *design-bid-build* method. Please see Appendix A-1 for a comparison of *design-bid-build* and *design-build* service delivery models.

The categories established in Article 5 and summarized above represent one way of classifying project delivery methods, among many others. There are, at present, no standard and generally accepted definitions of project delivery methods.⁸⁸ The American Institute of Architects (AIA) and the Associated General Contractors of America (AGC), in their jointly produced and issued *Primer on Project Delivery*, noting this lack, also noted that

. . . many groups, organizations, and individuals have developed their own. In doing so, they have often used different characteristics to define the delivery methods. The result has been a multiplicity of definitions, none of which is either entirely right or entirely wrong.⁸⁹

For example, the AIA and AGC classify "three primary delivery methods" as "design-bid-build, design build and construction management at risk."⁹⁰ They also make a distinction between project delivery, defined as "the method for assigning responsibility to an organization or an individual for providing design and construction services," and project management, defined as "the means for coordinating the process of design and construction (planning, staffing, organizing, budgeting, scheduling, monitoring."⁹¹ The legal authority to bind the owner differentiates the service delivery models from the models of project management, while the assignment of contractual responsibilities for project delivery becomes the basis for differentiating among the service delivery models.⁹² Any task force looking at creating flexibility in public procurement of construction would do well to review alternative classifications of service delivery models, and their underlying rationales, in addition to those put forth in Article 5.

The 2000 Update also provides alternative language to permit quality-based selection process for design-builder selection.⁹³ As noted earlier, the request for proposal, or solicitation document, must include design requirements and may, under certain circumstances, permit prequalification through a request for qualifications before the request for proposals, creating a short list of responsible bidders to engage in discussions and evaluations or pay stipends to the unsuccessful bidders.⁹⁴ Not only does the 2000 Update expressly eliminate an earlier expressed statutory preference for competitive sealed bidding, which remains as a default source selection method, but it also specifically authorizes multi-step sealed bidding within the competitive sealed bid context in order to "provide additional flexibility in meeting the designated public need."⁹⁵ These changes make it possible for public owners to focus on construction quality even within the competitive design-bid-build model.

Other features of the 2000 Update that help public owners increase the quality and, thus, value of public construction include a revised definition of architectural and engineering services and the requirement that bidders for certain design-build, design-build-finance-operate-maintain and design-build-operate-maintain contracts include the services of an independent peer reviewer "whose competence and qualifications to provide such services shall be an additional evaluation factor in the award of the contract."⁹⁶ A revised definition of "architectural and engineering services" conforms to the federal definition in order to "[promote] closer integration of project feasibility and evaluation services with the evaluation of design and project alternatives" which "reflects a growing need for public owners to assess the effects of alternative designs, technologies, projects, schedules and finance methods on initial and life-cycle quality, costs, and time of delivery of entire collections of infrastructure facilities."⁹⁷ The requirement of an independent peer reviewer is

intended "to provide the government with independent professional advice and assurance that key design elements of the project are consistent with the function description in the Request for Proposals and with the common law standard of professional care."⁹⁸

*Comparison of Design-Bid-Build and Design-Build*⁹⁹

Design-Bid-Build. In the traditional design-bid-build model, the owner hires a designer, first, to design project, including the preparation of construction drawings, specifications and contract documents, and then submits the design package to general contractors who bid for work on the basis of sealed lump sum, unit-price or cost-plus.¹⁰⁰ The winning contractor is responsible for constructing project as designed, subcontracting, as needed, with various contractors for specific tasks.¹⁰¹ During the construction phase, the interaction of the designer with the contractor can vary from limited oversight, responding to questions about design on behalf of owner to administering construction contract on behalf of owner. The virtues of this traditional method derive from its wide applicability and understanding, due to the well-established and clearly defined roles, as well as a level of cost certainty because bids are based on a complete design, with plans and specifications. The drawbacks to this method, however, derive from the same qualities and include a longer schedule,¹⁰² since the design must be substantially complete before bidding, thus prohibiting overlapping phases to compress the schedule, and a higher potential for an adversarial relationship among owner, designer and contractor. The temporal separation between the designer and the contractor impedes a joint understanding about constructability, schedule and cost implications of the design, the specified materials, the means of construction and costs. The legal relationships, such as the owner's liability for design, create exposure to contractor claims over design and constructability issues, and the least-cost approach requires increased owner oversight and quality review. These drawbacks contribute to increasing the potential for schedule uncertainty, which can lead to increased costs.

Design-Build. In the design/build method,¹⁰³ the owner contracts with a team that is responsible for both project design and construction, often a joint venture of a general contractor and a designer, after owner has approved the preliminary project scope or design. The owner and team negotiate, early in the process, a contract with a fixed price for which the team agrees to perform all functions from post preliminary design to construction and to coordinate the design and construction interface that is often problematic with the design-bid-build model. The method internalizes, within the team, some of the conflicts among the owner, designer and builder, providing the owner with single point of responsibility, as well as providing the opportunity to begin construction earlier, before design is complete, and thus provide the potential to reduce the overall project delivery period. The ability to integrate design and construction professionals earlier in the process permits both professions to benefit each other, increasing the period of design freedom informed by constructability. The ability to overlap phases to decrease construction duration requires the owner's control of the site and rights of way, which public owners often do not have in the early stages of a project. Further, the advantages come at the cost of a significant loss of the owner's control and involvement. In order to verify best value as well as the adequacy of the preliminary plans on which price is based, the owner is well

advised to hire additional consultant to perform the traditional designer function. Conventional wisdom concludes that this model is best for conventional project types, with defined requirements and widely available expertise such as vertical and above ground projects.¹⁰⁴ Since successful implementation of this model also requires a proper balance of design expertise, financial capability, construction experience and experience with this particular model, procurement of the design/build team requires great care, something the public procurement methods may make difficult.

The British Experience and Increasing the Value of Public Works Programs

Beginning in the 1990s and sustained as of this date, the British government sponsored an initial collaboration between government and the construction industry to improve the performance of the construction industry and its product. This initial effort eventually expanded to generate quantitatively-based analyses and data on the relation among construction, the economy and the quality of life within a built environment. "A particular strength of [the British approach] was that they did not try to prescribe what should be done but invited innovation while offering a context in which it can take place, be evaluated and shared."¹⁰⁵ This effort received its impetus due to significant planned increases in public capital spending in the face of a universal consensus that much of already-built environment, much of it publicly financed, and the process by which it was achieved were unsatisfactory in almost every way. During the course of this public-private journey:

. . . a succession of government reports investigating the problems of the industry . . . have highlighted the inefficiency caused by the sheer scale and complexity of the construction industry. A recurring recommendation is the need for the construction process to be viewed in a holistic way by a multidisciplinary team. This reflects the fact that construction draws knowledge from many areas, and an important and undervalued area is economics.¹⁰⁶

Were the Governor and Legislature to consider looking at the economic impact of construction upon the State and regional economies, as a prelude to revising New York's statutory scheme governing construction, they might do well first to look at this British experience, as well as the quantitative work produced as a result of it.

The initial round of independent analysis of the construction industry, conducted in 1994 by a group "commissioned by the British government and the construction industry with the support of client bodies,"¹⁰⁷ focused primarily "on the business process of construction rather than its products and their impact."¹⁰⁸ The conclusion, summarized in the report, "Constructing the Team," was that "the industry's traditional methods of procurement and contract management and its adversarial culture caused inefficiency and ineffectiveness."¹⁰⁹ In the words of the author of the report, "[t]he central message of "Constructing the Team" in 1994 was that the client should be at the core of the construction process."¹¹⁰

Four years later, in 1998, a Construction Task Force "was set up to advise the Deputy Prime Minister from the client's perspective on the opportunities to improve the efficiency and quality of delivery of construction, to reinforce the impetus for change and to make industry more responsive to customer needs."¹¹¹ The resulting report, "Rethinking Construction,"¹¹² introduced the lean production and continuous improvement concepts,¹¹³ while continuing to focus on the customer as a "driver of

change,"¹¹⁴ although the absence of a "debate on the attributes of the product" continued.¹¹⁵ This report projected a ten percent increase in productivity without changing the level of resources dedicated to construction as a result of proposals to increase efficiency including reducing restraints on supply.¹¹⁶

While "Rethinking Construction" did not focus directly on the impact of design on the economy, its implementing entity, the Movement for Innovation (M4I), did. Architects, by virtue of their place in the construction supply chain, have an "overview of the entire project" and are well placed to "synthesize lean construction" and its objectives.¹¹⁷ A focus on methodologies to quantify intangible externalities emerged in 2000 from the Royal Institute for British Architects (RIBA), which concluded that "the value of design can be, and has to be, measured and demonstrated."¹¹⁸ Without quantitative measures of design value, "there is a possibility that the success of construction projects will be measured by the process alone."¹¹⁹ RIBA announced its partnership with the Construction Industry Council to devise Design Quality Indicators (DQI) and the process for using them,¹²⁰ which has been in use in Great Britain since mid-2002. As an indication of the soundness of DQI and the analysis behind it, the "Green Book", an official publication of the British Treasury, includes design quality as one of the many issues relevant to appraisal and evaluation of new or replacement capital projects or procurement of works from the private sector suppliers.¹²¹

In 2002, the British government commissioned another task force to study the government's research and development policies and practices. "Rethinking Construction Innovation and Research"¹²² picked up a thread from the Egan Report which suggested a focused research and development program would be necessary to make many of the earlier recommendations and estimated benefits possible.¹²³ While the Fairclough Report concluded that the "strategic framework for R&D should be owned and managed by industry," the fragmented nature of the industry requires government sponsorship and funding to produce socially useful amounts of research and development and to structure a mechanism to capture innovations from institutional learning for future projects across markets and regions.¹²⁴

As a result of all this activity, there has been a resurgence of interest in identifying and quantifying the value of the seeming intangible externalities generated by the products of construction.¹²⁵ In 2001, the Commission on the Built Environment released a seminal report—The Value of Urban Design—that catalogued the state of capacity to quantify intangible externalities of design in the built environment. While there are difficulties in quantifying intangible externalities arising from construction,¹²⁶ they conceptually fit the definition, although it may be necessary to evaluate impacts and costs over a longer period of time than is typical in the investment decision horizon which covers the initial period of construction but not long-term operation.¹²⁷ For example, negative consequences of poor design and construction include avoidable maintenance, energy and security expenses, as well as, within the built environment, avoidable costs for "rectifying urban design mistakes."¹²⁸ Positive consequences of design and construction excellence include

'life giving' mixed-use environments, urban regeneration, increased marketing opportunities, increased investment opportunities, increased confidence in investment opportunities, better connected, inclusive and accessible urban places, sensitivity to context, enhanced public safety and security, increased energy efficiency.¹²⁹ This recent work can inform a review and revision or elimination of existing regulations, as well as provide a foundation for proposing new ones.

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ENDNOTES

¹ The Wicks Law, named after State Senator Alfred H. Wicks, is a collective reference to three separate laws requiring multiple prime contracting. The multiple prime contractor requirement first became effective for the State in 1909, and, after an interim repeal, it was re-enacted in 1921. (State Finance Law, Section 135) The multiple prime contractor requirement was applied to public housing projects in 1946, and to municipalities and other political subdivisions in 1953. (Public Housing Law, Section 151-a; General Municipal Law, Section 101) The Committee on Municipal Affairs, *The Wicks Law: Repeal it Now*, (New York: The Association of the Bar of the City of New York, 1986), pp. 2-3.

² The following discussion of the Wicks Bill is derived from the 2007 negotiated version, which has been incorporated in its entirety into the Governor's 2008 program legislation. Unless otherwise noted, the source for the following discussion of the particulars of the Wicks Bill is the memorandum accompanying the program legislation.

³ Assembly Bill 9204 (2007).

⁴ Senate Bill 6808/Assembly Bill 9806, Public Protection and General Government, Part Q ("2008 Proposal"), §§ 1-19; Memorandum in Support. The Governor established the Commission on Local Government Efficiency and Competitiveness in April 2007 to "make recommendations on the measures we much adopt to facilitate and expedite partnership among State and local governments to improve the effectiveness and efficiency of local governments." (From Governor's letter, dated April 23, 2007, to local government officials.)

Other provisions of the 2008 Proposal would raise, from \$10,000 to \$50,000, the threshold requiring that awards for public works contracts be made to the lowest responsible bidder after advertisement for sealed bids; as well as raise from \$10,000 to \$20,000, the threshold requiring the same for purchase contracts. (§ 21)

The 2008 Proposal would also permit, for purchase contracts but not for construction, local governments to make an award based on best value instead of lowest responsible price, taking other factors such as quality and efficiency into account. (§ 22; see State Finance Law, § 163). A few other states, however, permit awards for construction based on some conception of value that is broader than price. Kansas permits the state, for competitively bid construction projects, to consider cost factors other than the initial purchase price when determining the lowest bidder and may consider a "cost-value" model that includes factors such as compatibility, capability, growth and contractor support. Minnesota permits the state to award construction contracts on the basis of best value, taking into account, among other factors, such as environmental considerations, quality and vendor performance, in addition to price. And, Texas permits the state and some local governments to use best value to determine which of several available service delivery methods/procurement methods to use for construction projects. (Source: Love, Michael K. and Douglas L. Patin, editors. *State Public Construction Law Source Book*. (Chicago: CCH Incorporated, 2002)). The survey of the 50 states in this report was limited to review of this volume, published in 2002; thus, any discussion, in this report, of construction law outside New York does not reflect any changes in law since 2002. To the extent there are changes elsewhere in the nation, one can reasonably assume they are in the direction of increased flexibility, leaving New York among a smaller number of jurisdictions subject to the least flexible laws.

New York State expresses public procurement of construction services in terms of "contracts for public works." (See General Municipal Law, § 103) This particular expression linked to the requirement of lowest price reduces the construction of infrastructure or a structure to a standard commodity or good, the price of which is the only meaningful distinguishing feature. The reality behind this view of construction was much truer when these provisions were adopted than they are today. When building technology was much simpler than it is now, it was more likely that final detailed plans and drawings

upon which the bids were made were sufficiently complete and accurate to render unnecessary any further application of discretion, skill and professional judgment on the part of the contractor. Modern building technology has made final specifications, upon which the bids are made, relatively less final and complete, exposing the contractor to the risk of having to apply professional skills and make judgments for which it is not compensated in the lowest price procurement model. Further, it should be noted that protecting the public fisc over the period of time a project is constructed *and* operating requires an evaluation of costs, in addition to the initial construction costs, that are directly related to the *quality* of design and construction.

⁵ Multiple prime contracting is a variation on the design-bid-build model of construction service delivery, in which the owner holds separate contracts with specialized contractors and has the responsibility of managing, or hiring someone to manage the project schedule and budget. Benefits of multiple prime contracting can include facilitating "fast-tracking" and flexibility because contracts can be awarded as soon as respective aspect of design is complete, giving the owner more control over project schedule because owner can set bidding schedule and avoiding contractor mark up because the owner can directly procure major material items. The disadvantages, in the multiple prime arrangement, flow from the general contractor's lack of contractual responsibility to coordinate work among trades, which often impacts the schedule, generating delay; in addition, the final project cost cannot known until last prime contract is awarded. (Source: AECOM materials on Program Management Overview, November 30, 2005, and the Construction Management Association of America (CMAA) website (<http://www.cmaanet.org>) *Choosing the Best Delivery Method for Your Project.*)

⁶ Nevada, North Dakota, Ohio and Pennsylvania mandate multiple prime contracts for public works in a manner similar to that of New York. Most states have no statutes on the issue and thus expressly neither authorize nor prohibit multiple prime contracting. Delaware allows it where appropriate, and recent state authorization of alternatives to competitive bidding is thought to permit it in Maine. New Jersey and North Carolina expressly authorize multiple prime contracting as an option. Illinois authorizes it, but the supervening principle of competitive bidding requires that multiple awards not be made when it is clear that a single award would fully serve state needs. In Kansas, which also authorizes multiple prime contracting, one of the multiple primes must be designated the prime contractor who is responsible for coordinating all the work. (Source: Love and Patin)

⁷ Myers, Danny. *Construction Economics: A New Approach* (London: Spon Press, 2004), p. 191. For a sense of magnitude, public construction accounted for approximately 48 percent of construction activity in New York City in 2006, and is projected to account for approximately 47 percent in 2007, 46 percent in 2008 and 43 percent in 2009. New York Building Congress, *Construction Outlook 2007-2009: Construction Remains White Hot*, p. 1 (from website: <http://www.buildingcongress.com>). The corollary to the magnitude of the public works portion of the construction industry's work is that "the largest single beneficiary of a radically improved construction industry would be the public sector." See also Fairclough, Sir John, *Rethinking Construction Innovation and Research: A Review of Government R&D Policies and Practices*. (London: Department of Trade and Industry, 2002), p. 28.

⁸ In the related press release, dated June 14, 2007, the Governor noted that the Wicks Bill was "a positive step forward in addressing the underlying structural problems that have negatively impacted our state's competitiveness." The Governor claimed that this recalibration would automatically exempt "more than 70 percent public works projects" in the State.

⁹ See Governor's 2008-2009 Executive Budget, Financial Plan Overview; see also Patton, Zach, "Unreconstructed," *Governing* (Washington, D.C.: Washington Quarterly, Inc., November 2007) Volume 21, No. 2, pp. 63-69.

¹⁰ American Bar Association (ABA). *The 2000 Model Procurement Code for State and Local Governments*. (ABA, 2000) ("2000 Update").

¹¹ Construction projects are, from an economic perspective, products of the construction industry. The products of construction consist of structures, ranging from private residential and commercial buildings to public building of all kinds, and infrastructure, ranging from private and public utility facilities to roads and highways. The intuitive sense that constructed projects can have a positive impact on the related economy underlies economic development programs and law. Yet, there has been less quantitative analysis of the relationship between the products of construction and the economy than of the relationship between the construction sector and the economy, which is fairly well understood. As a result of the change initiatives sponsored by the British government described in this report, however, the quantity of such analysis has increased.

¹² Patton, *op. cit.*, p. 66. "American industries have, in aggregate, increased the productivity of each worker by about 250 percent since 1964, according to the U.S. Bureau of Labor Statistics. But in the same time period, per-worker productivity in the construction industry dropped by 22 percent." *Idem*

¹³ Present use by the New York City's Department of Design and Construction (DDC) of Design Quality Indicators, quality metrics developed in Great Britain, in DDC's Design + Construction Excellence program, indicates the transferability of concepts and quantitative data from the British experience for New York State purposes.

¹⁴ Beginning in 1981, while the City was in a "control period" under the Financial Emergency Act and subject to rigorous external oversight, the City began to define its construction problem as a Wicks Law problem, in *Wicks Law Reform and Effective Management of Public Construction*, which was followed in 1984 by *Wicks Law Repeal: A Public Construction Necessity*. These reports were accompanied by quantitative data. In 1986, the year the City emerged from a control period to a sunset period under the Act, with lower levels of external oversight, the City released *Wick\$ Waste\$*. During these years and beyond, reform of the Wicks Law was quantified and inserted into the City's budget, as a significant part of the City's Program to Eliminate the Gap and a standard bearer in the City's legislative agenda with the State. The City's success in defining the Wicks Law as the sole cause of its problems in executing its capital program was matched by increased levels of conflict among stakeholders on this issue, rendering resolution not then possible.

¹⁵ Jenkins-Smith, Hank C. *Democratic Politics and Policy Analysis* (Pacific Grove: Brooks/Cole, 1990), p. 103.

¹⁶ Jenkins-Smith, *op. cit.*, p. 103. For example, analytical work emerging from Great Britain that has begun to quantify intangible benefits to owners and the public of the products of construction, such as added value from excellence in design, has been matched by work here, especially in New York. See Sallette, Marc A. The Economic Value of Investing in Architecture and Design, University of Chicago Graduate School of Business unpublished paper, March 19, 2003, p. 2; also, Macmillan, Sebastian. "Added Value of Good Design," *Building Research & Information* (2006), pp. 258-259, citing Pearce, David. The Social and Economic Value of the Built Environment, Construction Research and Innovation Strategy Panel (2003). See also Schwartz, Amy Ellen, Ingrid Gould Ellen, Michael H. Schill and Ioan Voicu, "The External Effects of Place-Based Subsidized Housing" (New York: Furman Center for Real Estate & Urban Policy (NYU) 2006) and Been, Vicki and Ioan Voicu, "The Effect of Community Gardens on Neighboring Property" (New York: Furman Center for Real Estate & Urban Policy (NYU) 2007).

¹⁷ Myers, *op. cit.*, p. 15.

¹⁸ *Ibid.*, p. 159.

¹⁹ A policy forum initially limited to participants on the basis of professional or technical competence increases the chance that policy recommendations will be feasible and informed by credible policy analysis because they share common bases to assess analytical claims. Jenkins-Smith, *op. cit.*, p. 103.

The British government has used the professionalized task force approach in this area to great effect, as described in greater detail throughout this report.

"A recurring recommendation is the need for the construction process to be viewed in a holistic way by a multidisciplinary team. This reflects the fact that construction draws knowledge from many areas, and an important but undervalued area is economics." Myers, *op. cit.*, p. 7. See also LePatner, Barry B., "Our Dysfunctional Construction Industry: How Did It Ever Get to This," *LePatner Report*, Volume 26, No. 1 (Spring 2006), p. 2 (from website: <http://www.lepatner.com>). Members of the design professions, by virtue of their place in the construction supply chain, have an "overview of the entire project," a perspective that would be critical to any such review. Royal Institute of British Architects (RIBA), "Architects and the Changing Construction Industry," p. 3 (leaflet enclosed in July 2000 issue of the RIBA Journal).

While many in New York politics might decry the task force approach as a time-honored way to avoid change, commencing a change effort in the construction industry with a professionalized task force has had some proven success in Great Britain as a way of promoting innovation in this area. "A particular strength of [the British approach] was that they did not try to prescribe what should be done but invited innovation while offering a context in which it can take place, be evaluated and shared." *Ibid.*, p. 3.

Another successful example, closer to home, of the professional task force approach to reform a complex area via analytically-based consensus, has been the New York City Department of Building's approach to reforming the recently adopted New York City Building Codes. A construction industry task force in New York could support ongoing work of the Commission on Local Government Efficiency and Competitiveness because much of the existing public procurement process operate as unfunded mandates, as well as the newly proposed property tax commission because, to the extent that the existing public procurement process generates debt service, paid with property taxes, at higher levels, it puts pressure on the local property tax rates. The Memorandum of Support of the 2008 Proposal noted the relation of public procurement reform to debt service savings. Finally, such a task force would complement any existing and planned economic development activities around the State by increasing its ability to efficiently exploit its capital program as an economic tool.

²⁰ The State imposed, on itself, the traditional service delivery model and associated constraints in 1940. (State Finance Law, Section 135) The State generally imposed, on its local governments, the service delivery model and similar constraints in 1953. (General Municipal Law, Section 103)

²¹ Myers, *op. cit.*, p. 7.

²² These official statistics use the North American Industry Classification System (NAICS) which defines construction as establishments primarily engaged in the construction of buildings or engineering projects, the preparation of sites for new construction and subdividing land for sale as building. The NAICS definition may include new work, additions, alterations or maintenance and repairs. (From U.S. Department of Labor, Bureau of Labor Statistics) To the extent these official statistics do not include related off-site construction activities including those within the supply-chain, they may understate the output of what could be considered the construction industry, especially as the construction industry over time more fully embraces the application of modern manufacturing techniques including off-site fabrication of building components. The traditional view of the industry as made up by suppliers to a construction project, from the architect and designers to the various construction contractors and subcontractors is narrower than one could devise that would include the various construction activities and entities within the supply-chain. Further, the nature of built urban areas in mature economies may further understate construction activity because repair and maintenance activities, which increase in mature economies while new construction occurs at declining rates, may not be fully included in the official statistics. Myers, *op. cit.*, pp. 1, 10, 17, 71, 193, 197-198; Fairclough, *op. cit.*, p. 11; LePatner, *op. cit.*, p. 2.

²³ Lipsey, Richard G. and Peter O. Steiner, *Economics, 4/e* (New York: Harper & Row, 1975), p. 559. "The change in expenditure might come, for example, from an increase in private investment, from

new government spending, or from additional household consumption expenditure accompanied by a decline in household savings." *Idem* Again, for a sense of magnitude, a private industry estimate of the construction industry's multiplier effects in New York suggests it could be 1.63 in the State and 1.40 in New York City.

²⁴ Construction demand is considered a derived demand, ". . . in as much as the goods are not necessarily demanded in their own right but for what they can add to the final good or service being produced." Myers, *op. cit.*, p. 60. Known as "investment goods", these include both private sector commercial and residential projects, as well as public sector infrastructure and structure projects. State and local governments procure construction as part of effecting their public works—or public goods—programs, generating a significant portion of the construction industry's work. Thus, the capital programs of all State and local government entities function as a demand management tool for the State. *Ibid.*, pp. 191, 193, 201-203.

²⁵ *Ibid.*, pp. 7, 190. The performance of the construction industry is conceptualized as a building cycle, and it is thought that studying building cycles, in view of the strong relationship between the building and business cycles, ". . . may contribute to a better understanding of business fluctuations." *Ibid.*, p. 190. At the same time, however, changes in the building cycle—both expansion and contraction—are thus more volatile than those in the general business cycle, giving statutory changes the potential for great economic impact in both directions. *Ibid.*, pp. 190-191.

²⁶ Fairclough, *op. cit.*, p. 11; Musgrave, Richard A. and Peggy B. Musgrave. *Public Finance in Theory and Practice*, 5/e (New York: McGraw-Hill Book Company, 1989), p. 6; Myers, *op. cit.*, p. 181.

²⁷ Myers, *op. cit.*, p. 15.

²⁸ Fairclough, *op. cit.*, p. 14.

²⁹ Fairclough, *op. cit.*, p. 14-15. The construction industry "is dominated by a large number of relatively small firms, spread over a vast geographical area." Myers, p. 7. The construction industry within any jurisdiction ". . . is concerned with producing and maintaining a wide variety of durable buildings and structures, and as a consequence, [contains] many construction markets." Myers, p. 10. Further, as a highly fragmented market dominated by small firms, "[t]he type of construction—particularly in terms of its size and complexity, its geographical location, and the nature of the client—will define the market in each case." Myers, *op. cit.*, p. 10, citing Drew and Skitmore (1997: 470).

³⁰ See Cole, James D. "Constitutional Home Rule in New York: The Ghost of Home Rule", *St. John's Law Review*, 1985, Vol. 59, pp. 713-749. For example, were a New York local government, even a large one such as New York, interested in improving its local economy by making its capital program more efficient and effective, existing State law governing public procurement precludes most local legislation on the topic, thus limiting the scope or effectiveness of such local efforts. Thus, it would be necessary in New York for the State to reform the public construction law for its local governments, as well as for itself.

³¹ Musgrave and Musgrave, *op. cit.*, pp. 7-9, 54, 446. As an illustrative example of these public economic concepts, optimal levels of research and development in the construction industry are unlikely to occur without government sponsorship because private funders of research and development cannot exclude others from the benefits of resulting research. But, similar to the private sector that cannot contain the benefits of their funded research and development, local government cannot contain such benefits within its jurisdictional boundaries any better and is unlikely to provide for research and development. Thus, a higher level of government, like the State, is a more likely and appropriate level of government to engage in such activity. The State, concerned with quality and improving the value and economic potential of projects and the built environment, can invest in related construction research and development that would benefit not only its own projects and those

of all local governments, but also those of the private sector. As important, investments in research and development among appropriate educational institutions around the State would have further positive economic effects within the related communities. Fairclough, *op.cit.*, pp. 14, 19. See also, LePatner, Barry B., "Construction Technology: Adoption is slow, but hope remains," *LePatner Report*, Vol. 26, No. 4 (Winter + Spring 2007), pp. 1-2 (from website: <http://www.lepatner.com>)

³² Construction Law Committee, *Wicks Law Report* (New York: The Association of the Bar of the City of New York, March 1994), pp. 1-2.

³³ *Ibid.*, p. 2, quoting from R. Nash and M. Love, "Innovations in Federal Construction Contracting," 45 *Geo. Wash. L. Rev.* 309, 416 (1977).

³⁴ *Ibid.*, p. 5.

³⁵ Wicks Bill, Sections 1 and 2, amending the General Municipal Law; § 3, amending the State Finance Law; § 4, amending the Public Housing Law; §§ 5 and 6, amending the Education Law; §§ 7 and 8, amending the Public Authorities Law relating to the New York City Water Finance Authority; § 9, amending the Public Authorities Law relating to Westchester County Health Care Corporation; § 10, amending the Public Authorities Law relating to Nassau Health Care Corporation; § 11, amending the Public Authorities Law relating to Clifton-Fine Health Care Corporation; § 12, amending the Public Authorities Law relating to Erie County; § 13, amending Chapter 560 of the Laws of 1980 relating to New York City's solid waste management plans; and, § 14, amending the Public Authorities Law relating to the Dormitory Authority of the State of New York.

³⁶ Construction Law Committee, *op. cit.*, pp. 7-8.

³⁷ Wicks Bill, § 18.

³⁸ There is currently no statutory authorization for project labor agreements in New York. The court, in *New York State Chapter, Inc. v. New York State Thruway Authority*, 88 N.Y.2d 56 (1996), held that existing public procurement law did not prohibit project labor agreements, but that such law required public owners to demonstrate that a project labor agreement satisfy the expressed public purposes underlying such statutes; namely, fiscal prudence and prevention of favoritism, improvidence, fraud and corruption. Other decisions have elaborated on various issues related to the consonance of a particular project labor agreement and the expressed public purposes of existing public procurement law.

³⁹ In a project labor agreement (PLA), the project owner (public or private) or the contractor and the various trades for required for the project, represented by the relevant unions, agree to various working terms and conditions in advance of bidding for the project. The terms and conditions cover working conditions, including wages and work rules. They also include dispute resolution procedures because they typically include a promise by the unions not to strike. The terms and conditions would apply to all winning bidders for the project regardless of whether their workers are unionized. U.S. Office of Management and Budget, "Statement of John Koskinen, Deputy Director for Management, Before the Committee on Labor and Human Resources, U.S. Senate," April 30, 1997.

⁴⁰ Contract would include subcontract, lease, grant, bond, covenant, or other agreement for a project undertaken pursuant to the exemption-from-Wicks process.

⁴¹ The other statutory impediment is the requirement for public bidding and award to the lowest price. (General Municipal Law, Section 103(1))

⁴² Wicks Bill, § 2 with respect to local governments. Many states have some form of sub-contractor listing requirements: Alaska, Arkansas, California, Connecticut, Delaware, Hawaii, Idaho, Nevada, New

Jersey, New Mexico, North Carolina, Rhode Island, South Carolina, Utah, Washington and West Virginia. Maine has a subcontractor bid depository system and Massachusetts has a filed sub-bid requirement. (Source: Love and Patin)

⁴³ Bid shopping occurs when a general contractor seeks "bids from subcontractors other than the one whose bid amount the general contractor used in calculating its own bid, and often involves the general's informing the other subcontractor of the amount of the low bid and inviting them to undercut it." Bid negotiation occurs when the general contractor attempts "to negotiate a lower price than that bid from the subcontractor whose bid figure the general employed in calculating its own bid, frequently by threatening to subcontract the work to a third-party." Construction Law Committee, *op. cit.*, p. 9.

⁴⁴ This requirement would be similar to that of the New York City School Construction Authority (SCA), except that it would provide a process for changing listed subcontractors while the SCA listing requirement does not. (Public Authorities Law, Section 1735(3))

⁴⁵ Construction Law Committee, *op. cit.*, pp. 8-14.

⁴⁶ *Idem* This report summarized New York case law supporting a "Catch 22"-like situation for the subcontractor that is neither correctable under present case law nor subject to collective practices. Subcontractors may be held to their bid and prices quoted in bid to the general contractor under principles of promissory estoppel, but promissory estoppel principles do not bind the general contractor to use the subcontractor who provided the quotes or the quoted figures themselves. One reason for the historical resistance to Wicks reform is that the Wicks Law, while not an economically-based solution to this situation, *does* provide protection to those contractors subject to its provisions. While subcontractor listing requirements are the typical solution to this situation, decisions in Arizona, Connecticut, Florida and North Carolina have been more sensitive to this "Catch 22"-like situation. (Source: Love and Patin)

⁴⁷ Construction Law Committee, *op. cit.*, p. 14. The existence of an economic justification for the practices of bid shopping and bid negotiation suggests an opportunity for economic analysis to evaluate and compare the costs and benefits of the existing situation with those of the proposed change.

⁴⁸ Wicks Bill, §§ 15 and 16, respectively amending General Municipal Law and State Finance Law. Of the majority of states that enumerate the number of days within which the general contractor must pay the subcontractors, ten states require payment within seven or fewer days from receipt by the owner—Arizona, Colorado, Maine, Montana, New Mexico, North Carolina, South Carolina, Texas Vermont, Virginia and Wisconsin. (Source: Love and Patin) The Wicks Bill would eliminate New York City's current exemption from the State law prompt payment provision because other New York public owners subject to the Wicks Bill would be following the practice now required of the City.

⁴⁹ Wicks Bill, § 19.

⁵⁰ Wicks Bill, § 1-a, amending the General Municipal Law.

⁵¹ AECOM, *op. cit.*; CMAA, *op. cit.* This pre-qualification authorization would be permissive in a manner similar to that of the SCA; and, there is substantial overlap between the two sets of criteria for evaluation of contractors for pre-qualification. The Wick's Bill qualification criteria, however, would place additional emphasis on compliance with equal employment opportunity requirements and health and safety experience, in a manner similar to that of the Coordinated Construction Act for Lower Manhattan. (Unconsolidated Laws of New York, 2004 Regular Session, Chapter 24, § 4)

⁵² Prequalification is required to some degree, most often for highway projects, in many states. Alabama, Colorado, Connecticut, Indiana, Maine, Massachusetts and Washington mandate it in various circumstances, while Kansas permits it. (Source: Love and Patin)

⁵³ *Op. cit.*, Musgrave and Musgrave, pp. 5-9, 41-58, 446-453; *op. cit.*, Myers, pp. 39-40, 147-159, 184-186, 191. Public welfare economics deems government to be the appropriate actor to correct for market failures in efficiently producing—or allocating resources for the production of—the politically desired levels of pure social goods and services as well as correcting for negative and positive externalities with mixed social goods and services. One only has to review the State and local governments' capital budgets to easily identify physical manifestations of pure and mixed social goods. The practical inability to exclude consumers from the benefits of certain goods or services and the inefficiency of such exclusion because consumption by one does not appreciably diminish others' ability to consume, renders certain goods and services, such as national defense, public safety, roads, highways and light houses, "social" or "public" goods. The market also fails to provide the efficient amount of certain mixed public and private goods and services due to the problem of "externalities." "Externalities" is a term economists use to describe instances, either in a negative context or a positive context, where the market fails to provide the socially desired amount of certain mixed public and private goods and services because the market's pricing mechanism is inadequate. When the market does not include the cost of negative consequences to private transactions, such as pollution or unsafe construction practices, it produces too much of the item generating "negative externalities." Conversely, the private market often produces too little of an item generating "positive externalities" for society, such as education, health care or sustainable buildings. State and local governments have varying abilities to intervene in the economy to correct for market failures. Of the three categories of fiscal, monetary and direct policy intervention, state and local governments are able to participate in two in varying degrees—direct policy intervention, through legislation, and fiscal intervention, through expenditures in the budget, as well as taxes and subsidies.

⁵⁴ Government, even as approximated at lower state and local levels, performs a macroeconomic stabilization function when it uses budget policy, including the capital budget, "as a means of maintaining high employment, a reasonable degree of price level stability, and an appropriate rate of economic growth. . .". Musgrave and Musgrave, *op. cit.*, pp. 113-129; Myers, *op. cit.*, pp. 181-192.

⁵⁵ While economic efficiencies are distinct from budget efficiencies, both could come from similar activities. With respect to the budget, to the extent current statutory and regulatory schemes for construction embed unnecessary delays into any part of the process from project inception to completion, they embed unnecessary and avoidable costs that could be unleashed for additional projects or alternative expenditures.

The idea that government regulation reform aimed at both private and public projects can increase economic efficiency is consistent with findings from the seminal 1988 RAND report that studied the outcomes, including cost outcomes, of 52 civilian projects, consisting of government-owned and industry-owned projects, as well as jointly-owned projects. One of the primary findings of this RAND report was that "[c]ost growth and schedule slippage for projects in the megaproject database are driven primarily by conflicts between the projects and the host governments, i.e., institutional problems relating to environmental regulations and opposition, health and safety rules and regulations, and labor practices and procurement controls." Many recommendations from this report focused on practical, but often forgotten, techniques of project risk management. But echoing the sentiment of "we have met the enemy and he is us", the RAND study pointed out that while government process is the most significant driver of costs for mega projects, the "host government makes the rules; the host government can change the rules." Merrow, Edward W. "Understanding the Outcomes of Megaprojects: A Quantitative Analysis of Very Large Civilian Projects" (Santa Monica: The RAND Corporation, 1988), pp. iv, 5, 62. See also, Kelly, Walt. Pogo comic strip.

⁵⁶ It is not unusual for government to use the public procurement scheme to effect policies aimed at externalities that are often unrelated to procurement *qua* procurement. At a basic level, the object of public procurement laws is to authorize government to purchase goods and services with public funds to accomplish its various functions. As these authorizations are typically expressed as a process or set of processes, one public policy objective directly related to procurement *qua* procurement is that these public processes be fair and open. Since public funds pay for these goods and services, another direct public policy is to establish criteria related to price or value. Finally, procurement law often justifies process rules and price or value criteria as explicit ways of avoiding fraud and abuse, the potential for which exists in all areas of government.

Open competitive bidding for items or services awarded to the lowest bidder can satisfy these procurement-related public policies much of the time, and for many public procurement laws it is an exclusive option, if not the default option. The Model Procurement Code establishes other appropriate mechanisms to satisfy these procurement-related public policies. To the extent the open competitive bidding requirement is a mechanism to approximate best value, it relates to procurement *qua* procurement and one can debate whether it serves as an appropriate proxy for value in all instances. Open competitive bidding can also be one way to demonstrate a fair process. To the extent an open competitive bidding requirement is thought, however, as a mechanism to assure a competitive construction market in an economic sense, it may fall quite short, in view of the realities of the fragmented construction industry. Other unrelated policy objectives, such as initiatives designed to encourage small or minority business development or sustainability, appended to the procurement scheme, may be economically ineffective or inefficient if enacted at the local government level.

⁵⁷ Joint Committee of The American Institute of Architects (AIA) and The Associated General Contractors of America (AGC), *Primer on Project Delivery* (Washington, D.C.:AIA and AGC, 2004), p. 1.

⁵⁸ Myers, *op. cit.*, pp. 149-150, 251. See also Stiglitz, Joseph E. "Principal and Agent, *The New Palgrave: A Dictionary of Economics*, Vol. 3 (London: Macmillan, 1987), pp. 966-71; Myers,

⁵⁹ With New York, 26 states tend to limit capital procurement to the traditional design bid build method awarded to the lowest responsive and responsible bidder include: Alabama, Arkansas, California, Delaware, Georgia, Indiana, Iowa, Kansas, Louisiana, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, Ohio, Oklahoma, Pennsylvania, South Dakota, Washington, Wisconsin and Wyoming. For some of these states, such as California, Delaware, Indiana, Kansas, Louisiana and Wyoming, the requirement that full plans and specifications be prepared prohibits service delivery methods such as design build. For others, such as Kansas, Montana, Nebraska and South Dakota, licensing requirements for architects and engineers prohibits design build. (Source: Love and Patin)

⁶⁰ These states include Alaska, Florida, Hawaii, Illinois, Kentucky, Maryland, New Mexico, North Carolina, Rhode Island, South Carolina, Tennessee and Texas. Of these states, the following have adopted the 1979 Model Code: Alaska (1988), Arizona (1985), Kentucky (1979), Maryland (1981), New Mexico (1984), Rhode Island (1989) and South Carolina (1981). (Sources: Love and Patin) See also, ABA. "Analytical Summary of State Enactments," *Annotations to the Model Procurement Code for State and Local Governments*, 3rd ed. (ABA, 1996).

⁶¹ These include Arizona, North Carolina and Texas. (Source: Love and Patin)

⁶² ABA 2000 Update, *op. cit.*, p. v.

⁶³ Value is created by the interplay between a project's functions—use and aesthetics, primary and secondary—and the costs of such functions. The interplay is bounded by what the client/user wants and what the client/user is able and/or willing to pay. Lawrence D. Miles, Lawrence D. *Techniques of Value Analysis and Engineering*, 3rd ed. (Washington, D.C.: Lawrence D. Miles Value Foundation, 1989), pp. 3-5, 12, 14, 17, 25-29.

⁶⁴ Egan, Sir John. *Rethinking Construction*. (London: Department of Trade and Industry, 1998), p. 6

⁶⁵ Myers, *op. cit.*, p. 5. This is an example of increasing the efficiency of resource use along the existing production possibility curve. *Idem*

⁶⁶ Myers, *op. cit.*, pp. 60, 70-71.

⁶⁷ "Good examples of direct policy within the area of construction economics include building and planning regulations to protect the environment, and specific initiatives such as the Rethinking Construction movement (the Egan Report) and the sustainable construction agenda introduced to change cultural attitudes towards productivity, safety, and the environment. These initiatives are aimed at stimulating growth, stability and environmental performance within the sector." Myers, *op. cit.*, p. 186.

⁶⁸ For an excellent example of how a rigorous review of various regulations that individually and cumulatively have a negative impact on a particular segment of the construction industry—affordable housing—yielding many opportunities for targeted reform to improve related functions on the margin, see Salama, Jerry J., Michael H. Schill and Jonathan D. Springer, *Reducing the Cost of New Housing Construction in New York City: 2005 Update*, (New York: Furman Center for Real Estate and Urban Policy (NYU) 2005).

⁶⁹ Myers, *op. cit.*, pp. 121-126.

⁷⁰ ABA 2000 Update, *op. cit.*, p. v. The earlier Model Procurement Code was promulgated in 1979.

⁷¹ *Ibid.*, p. iv.

⁷² *Ibid.*, Sections 5-201 and 5-101(2)-(5), pp. 40-44.

⁷³ *Ibid.*, Sections 5-101(4) and 5-101(5) and related commentary, pp. 40-41.

⁷⁴ *Ibid.*, Section 5-204(2).

⁷⁵ *Ibid.*, Section 5-101(6), subparagraph numbering removed, and related commentary, p. 41.

⁷⁶ *Ibid.*, Section 5-101(2) and related commentary, p. 40.

⁷⁷ MacCollum, David V. "Teamwork Can Tame Construction Hazards," *Engineering News-Record* (New York: McGraw Hill, November 12, 2007), p. 34.

⁷⁸ The techniques range from functional analysis conceptual design (a variant of value engineering) and multi-disciplinary design optimization to total quality management and lean manufacturing.

⁷⁹ Stocks, Samuel and Amarjit Singh, "Studies on the Impact of Functional Analysis Concept Design on Reduction in Change Orders," *Construction Management and Economics*, Vol. 17, Issue 3 (London: Taylor and Francis, May 1999), pp. 251-267. Moser, Cliff, "Using Active Value Engineering for Quality Management" and "Beyond Redlines: Creating a Practice-Based Quality Management Program," *AIA Practice Management Digest*, (website <http://www.aia.org/pm>) Summer 2006. McConahey, Erin, Philip Haves and Time Christ, "The Integration of Engineering and Architecture: A Perspective on Natural Ventilation for the New San Francisco Federal Building," (May 2002) presented at the American Council for an Energy Efficient Economy 2002 Summer Study on Energy Efficiency in Buildings, August 18-23, 2002. American Institute of Aeronautics and Astronautics, Inc. (AIAA), Technical Committee on Multidisciplinary Design Optimization, "White Paper on Current State of the Art," January 15, 1991.

Geyer, Phillip and Klaus Rueckert, "Conceptions for MDO in Structural Design of Buildings," 6th Congress of Structural and Multidisciplinary Optimization, May-June, 2005; Deremaux, Yann, Karen Willcox and Robert Haimes, "Physically-Based, Real-Time Visualization and Constrain Analysis in MDO, AIAA Paper 2003-3876. See also RIBA, *op. cit.*

⁸⁰ The earlier application of integrated design management tools illustrates a paradox of control—by embracing and integrating these tools and sharing, if not relinquishing, "power" with the other disciplines and stakeholders during the phase traditionally thought to be the domain of the designer, the designer increases his control over the design until the project's completion, while increasing the chances the project remains within original budget and schedule parameters. Better integration of these techniques from the beginning will increase the time in conceptual and preliminary design to "capture more knowledge" and "retain more design freedom later in the process in order to act on the new knowledge gained by analysis, experimentation and human reason." Deremaux, *op. cit.*, p. 1.

⁸¹ ABA 2000 Update, *op. cit.*, Section 5-101(3) and related commentary, p. 40. The 2000 Update defines functional requirements and design criteria as "design requirements". *Ibid.*, Section 5-101(6), p. 41.

⁸² ABA 2000 Update, *op. cit.*, Section 5-101(4), p. 40.

⁸³ *Ibid.*, commentary to Section 5-101(4), p. 40.

⁸⁴ *Idem* New York State has often authorized this model in the context of tax-exempt state created construction and financing authorities.

⁸⁵ *Ibid.*, Section 5-101(5), pp. 40-41.

⁸⁶ *Ibid.*, commentary to Section 5-101(5), p. 41.

⁸⁷ *Ibid.*, Section 5-202(3)-(6), pp. 44-45; Section 3-203(3), p. 26.

⁸⁸ AIA and AGC, *op. cit.*, p. 1.

⁸⁹ *Idem*

⁹⁰ *Idem*

⁹¹ *Ibid.*, p. 2.

⁹² *Idem*

⁹³ *Ibid.*, commentary to Section 5-202(4), p. 45.

⁹⁴ *Ibid.*, 5-204(2), pp. 46-47. The 2000 Update's approach to pre-qualification is not dissimilar to that of the Wick's Bill.

⁹⁵ *Ibid.*, p. viii; Section 3-202 (8) and related commentary, pp. 25-26.

⁹⁶ *Ibid.*, Sections 5-101(1) and 5-204(3)(b), pp. 39, 47-48.

⁹⁷ *Ibid.*, Section 5-101(1) and related commentary, p. 39.

⁹⁸ *Ibid.*, commentary to Section 5-204, p. 48.

⁹⁹ AECOM, *op. cit.*; CMAA, *op. cit.*; see also AIA and AGC, *op. cit.*

¹⁰⁰ In the public sector, the selection of the winning bid is often required by law to be made to the lowest responsive bid. In addition, statutory requirements that bid packages contain detailed plans and specifications prepared by professional architects and engineers have been interpreted to preclude alternative methods of service delivery, such as design-build. (Source: Love and Patin)

¹⁰¹ In the public sector, multiple prime contracting may be required.

¹⁰² As distinct from schedule uncertainty.

¹⁰³ Other variations include design/build/operate and design/build/operate/finance.

¹⁰⁴ The product of construction differs from the products of other manufacturing products in critical ways. They are physically "large, heavy and expensive" objects that are tied to their sites and contexts, facts which limit the ability to replicate them and achieve manufacturing economies. Further, in contrast to the typical manufacturing process where price can be known before fabrication, the construction process ". . . is complicated further by the fact that for most construction work a price needs to be stated before the activity commences—when all the costs are not yet known." This atypical pricing feature is further complicated by the typical method of competitive procurement, which ". . . , in turn, makes it difficult for potential contractors supplying their services to take advantage of the market . . .". Myers, *op. cit.*, p. 65; see also Chicago Architects Oral History Project, Interview of Carol Ross Barney by Deborah A. Burkhart, The Art Institute of Chicago, 2007, p. 8. The 2000 Update provides a menu of procurement vehicles as alternatives to competitive bid, which bring the designer and contractor closer in practical proximity, increasing understanding of the constructability of the design as well as reducing pricing risks.

¹⁰⁵ RIBA, *op. cit.*, p. 3. Present use by the New York City's Department of Design and Construction (DDC) of Design Quality Indicators, quality metrics developed in Great Britain, in DDC's Design + Construction Excellence program, indicates the transferability of concepts, measures and quantitative data from the British experience for New York State purposes.

¹⁰⁶ Myers, *op. cit.*, p. 7.

¹⁰⁷ National Audit Office (UK), "Modernising Construction," Report by the Comptroller and Auditor General, HC 87, Session 2000-2001, January 11, 2001, p. 1. (<http://www.nao.org.uk>) This report discusses the work of the Commission headed by Sir Michael Latham, as documented in "Constructing the Team," also referred to as the "Latham Report."

¹⁰⁸ Macmillan, Sebastian, "Added Value of Good Design," *Building Research & Information* (2006), pp. 258-259.

¹⁰⁹ National Audit Office, *op. cit.*, p. 19.

¹¹⁰ *Ibid.*, p. 1.

¹¹¹ *Ibid.*, p. 19.

¹¹² Egan, *op. cit.*

¹¹³ The methodology of Lean Thinking forces an industry to "change itself by rethinking the fundamentals of its delivery processes." RIBA, *op. cit.*, p. 3.

¹¹⁴ Egan, *op. cit.*, p. 3. In the follow up to the Egan Report, the Strategic Forum for Construction, published its report, "Accelerating Change" in 2002 and reiterated its commitment to industry integration and a "culture of continuous improvement based on performance measurement." Strategic Forum for Construction, *Accelerating Change* (London: Construction Industry Council, 2002), pp. 5, 10-11.

¹¹⁵ Macmillan, *op. cit.*, p. 259.

¹¹⁶ Myers, *op. cit.*, p. 5. "Several common sets of problem were identified as the root cause of this inefficiency. First, the industry demonstrated a poor safety record and an inability to recruit good staff. Second, there appeared to be no real culture of learning from previous projects, and no organised career structure to develop supervisory and management grades. Third, concern was expressed about the poor level of investment into research and development that restricted the industry's ability to innovate. The fourth, and possibly most worrying, problem that both reports observed was the fact that technology was not used widely enough across the construction sector." *Idem*

¹¹⁷ RIBA, *op. cit.*, p. 3. The State Office of General Services practices Total Quality Management principles, another design management technique related to lean manufacturing, as a result of adopting the International Standard Organization (ISO) Quality Management System. Like DDC, OGS Design and Construction Group (D&C) ". . . provides a full range of architectural, engineering and construction management services to state agencies for approximately \$650 million in design and construction projects a year. OGS D&C places a strong focus on the ISO Quality Management System for customer satisfaction, continuous improvement and cost effectiveness. It is the OGS D&C's policy to establish and maintain a documented Quality System. The Quality System conforms to the sections of ISO standards 9001:2000, which allows the group to obtain and maintain certification and contribute toward the D&C mission. The Quality Systems objectives are: to manage all project requirements in a timely, efficient, responsive and cost effective manner; to continually improve methods used to deliver professional services; and to seek ways to increase clients' satisfaction with OGS D&C's performance." New York State Office of General Services press release, "NYS OGS Design & Construction Receives ISO Certification: Only State Agency to Receive International Organization for Standardization Certification," dated October 10, 2006.

¹¹⁸ RIBA, *op. cit.*, p. 7.

¹¹⁹ *Idem*

¹²⁰ RIBA embraced industrial design techniques such as Lean Manufacturing to help them measure and demonstrate the value of design so that measures of a project's success would include the value contributed by design, as well as standard process measures such as budget, schedule and safety. RIBA acknowledged the importance of performance measurement to improving the construction process, *including* design process, which is the traditional domain of the architect, and the products of construction. DQI covers a spectrum of design quality measures related to a project's function, its build quality and its impact upon users and the surrounding community. The indicators cover those aspects that are fundamental, those that add value and those that represent excellence (collectively known as FAVE). DQI forms the basis of a structured dialogue among stakeholders at various points in the project process, as well as provide data for later project assessments and analysis. Early in the project, stakeholders engage in a FAVE session to assign project priorities for DQI, performing the critical function of project scoping. The initial collective project scope provides the baseline against which the team can conduct additional FAVE evaluations to measure success during design and at completion. RIBA, *op. cit.*; see also, Sallette, Marc A. "Design Values," *Urban Land* (Washington, D.C.: Urban Land Institute, November/December 2005), pp. 74-80.

¹²¹ HM Treasury, *The Green Book: Appraisal and Evaluation in Central Government*, (London), pp. 2, 10.

¹²² Fairclough, *op. cit.*

¹²³ *Ibid.*, p. 6.

¹²⁴ *Ibid.*, pp. 6, 14.

¹²⁵ Marc A. Sallette, "The Economic Value of Investing in Architecture and Design", University of Chicago Graduate School of Business, unpublished paper, March 19, 2003, p. 2; Macmillan, *op. cit.*, pp. 258-259, citing David Pearce, *The Social and Economic Value of the Built Environment*, Construction Research and Innovation Strategy Panel (2003).

¹²⁶ With respect to the benefits of excellence in design and construction, "[a] widely acknowledged difficulty with many of the benefits associated with good design is that they are hard to measure, or intangible, and this makes it difficult for those who procure buildings to assess how much it is worth investing in design and in construction." Macmillan, *op. cit.*, p. 264. This recent resurgence of interest builds upon the approach, if not the work, of an earlier architectural determinism sub-discipline from the last century. *Ibid.*, p. 258. As the Commission for Architecture and the Built Environment has stated, "Good design is not just about the aesthetic improvement of our environment, it is as much about improved quality of life, equality of opportunity and economic growth." *Ibid.*, p. 260. See Footnote 2.

¹²⁷ Myers, *op. cit.*, pp. 133-145, 161-176.

¹²⁸ Commission for Architecture and the Built Environment. *The Value of Urban Design* (Kent: Thomas Telford, 2001), p. 8. (<http://www.cabe.org.uk>)

¹²⁹ *Idem*