

TAXI STUDIES GROUP
RESEARCH REPORT

**Taxi Market Regulation, industry employment
and the identification of data toward informed policy decisions.**

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Prepared for SCOTECOM

TAXI MARKET REGULATION
Industry employment and the identification of data toward
informed policy decisions.

FINAL REPORT

Prepared for SCOTECON

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Section 1 Background to the Study

1.1 Background

Following the award of a SCOTECON research grant, the Taxi Studies Group of the Transport Research Institute, Napier University, has undertaken a study investigating impacts of regulatory change in the taxi market, and identifying measurable data appropriate to informing policy decisions.

The project ran for 4 months during early 2004, and has allowed for substantial investigation of the regulation and market for taxi services; the identification of metrics used in the assessment of taxi services; and indicative data appropriate to the development of related policies.

The research concludes with this report and contains:

- A summary of literature addressing the issues of regulation and control in transport, and specific texts reporting on the taxi industry
- The identification of key players
- The formulation of tools for assessment appropriate to identified markets
- Review of data currently available in the development of policy direction.

The work addressed a range of theoretical and practical issues, reviewing a broad range of literature ranging from documented impacts of existing taxi regulation, transport reform and service enhancement, to user and focus group experiences recorded in Scottish city taxi reviews and specific to this study. The work focused upon:

- Urban Economic Interaction
- Regulation and Regulatory Reform
- Issues arising in employment and industry stability

1.2 Summary of findings

The study revealed a wide range of experiences, and desires specific to the development of taxi transport and policies affecting taxi operation. Approaches tend to alternate between free market (competitive service provision), and a controlled licensed provision, with actors from both service types reviewing policy decisions in relation to passenger interest despite a number of differing interpretations of passenger benefit.

The work developed a Combined Indicator Taxi Model (CITM) using a combination of existing data arising from previous (separate) studies of unmet demand, cost and economic appraisals; and by identifying areas in which data was not currently available or widely used. The model has been used to test scenarios appropriate to the future licensing and control of taxis, as well as allowing informed critique of current changes in the taxi structure in Scotland.

The findings are consistent with previous studies underlining the significance of, and inter-relationships between, external policy environment and taxi service provision. As in previous analysis, changes in the structures in which taxis operate are seen to impact directly on the travelling public. The CITM model does, however, differ from previous work, by considering secondary and wider impacts of policy reform across a fuller spectrum of market participants. Longer term impacts, those resulting from aging taxi fleets, or inadequate cost recovery, also impact on the travelling public by reducing the ability of the taxi industry to sustain or develop growth.

Modelling a full cross section of indicators suggests an apparent inability of current policy and policy reform to achieve Pareto Optimality. Moreover, the CITM illustrates a number of negative impacts, mainly affecting the operator, mirrored in the experiences of some cities having been through reform.

1.3 Summary of conclusions

By developing and implementing the CITM, the research suggests that a range of policy measures may be more appropriate to

Policy choices made on the basis of a partial or incomplete analysis of all information increase the chances of unforeseen or negative secondary impacts working against the original goals of policy reform. Changes in the taxi industry in Scotland need to be aware of the medium and long term impacts of regulatory reform, and be seen to consider the longer term desires of a developing and sustainable industry.

Choices made in relation to the taxi industry reflect both structural and political objectives, and should be appropriate to location and geographical circumstance. In this respect 'one size fits all' approaches may not be appropriate, rather a consideration of a wider set of criteria applied as appropriate to local circumstance.

Section 2 Literature Review

As indicated in the original submission, a significant element of the work has concentrated on a review of current literature specific to taxi regulation, and its reform. Much of this literature considers changes in the regulatory structure in other countries, most particularly the USA following deregulation in the 1970s and early 1980s, and its subsequent re-regulation since these dates. Regulatory reforms in the UK, and impacts of changes in control have tended to affect utilities and non-taxi public transport, with taxi impacts reviewed less often, and mainly in trade documentation or consultants' reports. The review of literature has been expanded to identify correlations and transferability to the taxi industry.

2.1 Analysis of (Transport) Regulation in the United Kingdom

Control of transport, and other utilities, in the UK has developed significantly over time. The period from 1970 to the present day encompasses current reforms in the taxi industry, other transport modes and most UK utility companies including Gas, Water, and Electricity.

The conservative government of 1979, as with subsequent UK administrations, sought and achieved private funding for public utility services, typified by the privatisations of the 1980s and 1990s moving away from an expectation of a public sector service¹. The 'reform' concept was extended to include public transport services within the term of the 1984 Conservative government. Changes in the regulation of UK transport were introduced under the 1985 Transport Act, which principally affected the provision of bus services in England and Wales². The 1985 Act³ also included a taxi element in the provision of mass public transport by legislating for taxibus operation under restricted license. The '85 Act, and subsequent Railways Act (1993)⁴, have been reported on widely in the period since deregulation (Balcombe et al. 1988; Barrett 2000; Rye and Wilson 2001), with most literature making reference to classic economic arguments of competition existing where perfect market conditions apply. In a number of instances, market failure in transport provision has led to the introduction of new regulation. Bly (1987) identifies social impact and inclusive transport as significant to the reform of buses, questioning the concept of *one size fits all* concluding that bus companies were likely to suffer from an...*ill-defined path between commercial objectives and the wider social requirements*.

¹ Government operated Utilities are referred to in some literature as Government Companies (GOCOs)

² Excluding London

³ Transport Act (1985) de-restricted the quantity licensing of bus services in England and Wales, outside of London. Similar legislation applies in Scotland. Services in Northern Ireland have not been deregulated. The 1985 act also introduced the ability of taxi operators to run limited multi user bus services, referred to as 'Taxibus'.

⁴ The Railways Act (1993) introduced private operation to the railway services formerly the responsibility of the British Railways Board, ie, heavy rail operations in England, Wales and Scotland. Transport Acts have been introduced separately in the countries of the UK. England, Wales and Scotland operate an open market for bus services, and a franchised market for railways. Northern Ireland maintains control of public transport within a government Holding Company (NITCo / Translink).

Wider assessment includes analyses of the role played by taxi operating authorities (Tyson 2001) and comparative texts including Holvad (2003), who compares impacts of bus deregulation seen in Oxford, UK with operation in Odense, Denmark, identify passenger service criteria, and service level minima. Similar analysis exists for rural bus transport (Langridge 2002) where bus services are typically provided as non-commercial services requiring local government subsidy. During the period of transport reform in the UK, the regulation of taxi services remained broadly the same (Choong-Ho Chang 1998) despite significant changes in other public transport modes. Practices felt restrictive in other modes of transport have continued, and remain in place currently, in the taxi market.

Under current regulations, taxi services are provided commercially, within a competitive market for public and private transport. Regulations currently in place are intended to ensure the continued provision of service levels in instances of market failure within the taxi market. One of the reasons for the longevity of the regulatory structure, in which taxi services operate, has been the apparent success of the current structure. Taxi vehicles have remained broadly the same in appearance and function, while changes in tariffs follow similar patterns to Retail Price based inflation.

Recent critical review of the UK taxi industry follows an OFT investigation, and is focused upon quantity licensing of the transport mode. Quantity restrictions, despite accommodation within the existing legislation, have failed, it is suggested, to meet the immediate needs of the travelling public; in particular, a reduced ability to obtain taxis on demand during Friday and Saturday peak. The subsequent recommendation of deregulation mirrors similar reforms in the USA (since reversed) but fails to address the question of an industry voluntarily sustaining operating standards, or take full account of impacts on employment markets. Moreover, the regulation of transport is not a simple polar choice between full regulation or no regulation, rather a combination of control and market forces as appropriate to the best interests of public, including the determination of what is sustainable in the medium and longer term. In economic texts this may be equated to optimisation; of price (Trotter 1985; van Vuuren 2002 page 99) and service (Costelloe 2001) both impacting on the **customer**; Income (Cooper et al 2003) and extent of regulation (Leisey 2001) impacting on the **driver** operator of the taxi; and regulatory efficiency (Tyson 2001; Mollina 2004) impacting on the **regulator**.

Optimisation in the taxi industry equates to balancing divergent interests and expectation in the delivery of services. The concept is applied to some forms of transport as representing best practice where achieved, and as a method of assessing change. Costelloe et al (2001) refer to *Pareto Optimality* as a method for assessing the quality of public transport networks, as a subset of *Multiobjective Optimisation*. Pareto optimisation is often applied to divergent interests given its relative simplicity, in that all parties need to remain satisfied or experience increasing satisfaction, resulting from an improvement or change in operating framework. Loss of benefit to any single party is seen as negative. Difficulty arises in the application of Pareto Optimisation, in circumstances where market participants are not fully identified (as may exist in suppressed markets), or where local conditions favour improvement to single participants only (eg, where consumer interest is seen as paramount), or where specific timescales for assessment are appropriate (eg, where short term benefit is more significant than long term stability). The similar concept of Pareto Improvement

is applied to (Railway) transport pricing by van Vuuren (2002), and to taxi services in Dublin (Irish Competition Authority 1998). The Competition Authority identifies reform as achieving Pareto Improvement Criterion where it is felt to be *just*.

In the development of the taxi industry in the UK, any solution that achieves Pareto Optimality is seen as favourable (Cooper 2004) over partial solutions favouring one particular player. Experiences of regulatory reform in the USA, and more recent reforms in Sweden tend to suggest a lack of benefit to some market participants. Impacts on drivers, and on operating authorities, tend to be felt in the longer term, and will eventually impact on the quality of services experienced by the passenger, although initial and short-term benefits to the passenger included increased numbers of vehicles. The expected drop in tariff levels was not immediately apparent. Definition of market participants should include:

- Passengers (Current Customer Base)
- Suppressed demand (journeys made by alternative means or not made at all)
- Drivers / Operators (Medium and long term impacts)
- Licensing Authority

To achieve best service and public interest, regulation is an informed balance between safety, industry security, price and quantity. Regulation has not been lost in the de-restriction of transport modes, but focussed on issues pertinent to the political, economic and social desires for the transport mode.

2.2 Transport Supply and Urban Form Interaction

In addition to the economic regulation of transport, the interactions between seeking access, movement within a city, and the quality of the urban environment, impacts arising from movement, form the focus of some reviews. The concept that urban (and rural) environments are impacted by transport is equally appropriate to the control of differing modes as the direct cost controls of economic regulation. Sustainable ecologies, and communities will also affect the longer-term well being of populations served, by all modes, and impacts of transport should by extension form a part of the review of controls.

Transport is seen as a key element in enhancing actual and perceived quality of life in the urban environment (Bonaiuto 2003). Extent of access in the city is contributory to a sense of belonging, and inability to access facilities, for example from a lack of adequate transport, acts to reduce social interaction and creates social exclusion. The role of transport in the development and economic activity of the city is the focus of a substantial area of research and documented discussion (Camagni et al 2002). It is also noted that the concept of transport and urban interaction is not a new field. Key work by Colin Buchanan (1963)⁵ raised issues of traffic impact on the urban form. It is also significant that impacts of transport are not limited to positive contribution to social and economic capital, but are seen as having negative environmental and safety

⁵ The Buchanan Report was the first official document to recognise that growth of traffic threatened the quality of Urban life

implications, with latter focus as much on restriction of private cars, as on inclusive mobility. In this respect current texts dividing between planning for traffic management, travel planning (Raux and Andan 2002; Ison and Rye 2003) and the impacts of accommodating movement within public transport modes (Cairns 1998; Romilly 1999), in an attempt to alleviate some of the more fundamental negative impacts of individual private transport.

As transport and its environments are linked, a significant number of mode specific papers address the interaction of one on the other. Urban development follows transport mode, which in turn is impacted by changes in the urban structure, declining and changing as appropriate to circumstance (Costa 1996). Examples exist in most modes of Public Transport, from the development of residential areas in tandem with railways in Victorian London (Atkins 1993; Revill 2001)⁶, bus and variations of busway, of which a proportion of recent assessment (Spencer and Andong 1996) concentrates on the relative values of rail and bus mode in public acceptance. Private transport infrastructure, particularly the analysis of the impacts of highways, as well as freight and logistics, are also well documented (Han 2003), with most assessment based on deterministic models of traffic flow - Origin/Destination matrices assigned to highway, and in some models to public transport networks (Huisman and Boucherie 2001).

Taxi services are contributory to the urban environment in much the same way as other transport modes, but seldom feature in current analysis. The mode lies somewhere between the private and public transport arenas, and appears to have been avoided by both traffic management and most public transport research. The taxi occupies ground between public and private modes, not sharing the deterministic model characteristics of the private vehicle, or timetabled certainty of other forms of public transport. Such literature as relates specifically to taxis (Cooper et al 2003) often relates primarily to regulatory argument (Cains and Liston-Heyes 1996), as opposed to wider management issues including addressing underlying difficulties in staffing and maintaining standards. Furthermore, discussion appears to be reactive and in some instances, by repeating and/or reversing previous changes in regulation, cyclical. Some reforms that have resulted in deregulation, such as those in Dublin and East Coast cities in the USA, appear to be aimed at short term gain and popularity with the public, rather than industry stability and development. These have (Leisey 2001) led to the sharp reverses in regulation, deregulation leading to re-regulation in the US examples.

Urban interaction between transport and its environment requires appraisal of the longer-term benefits and problems of current reforms. Against this, a short-term approach appears to be favoured by political decision makers, in part as a result of the need for demonstrable short-term gain in the British political economy. The dichotomy of a need for results within the life of a parliament, and the long-term decline in the ability of an industry to sustain and improve services lies at the heart of policy decisions and reforming agendas.

⁶ Metroland was a title given by the Metropolitan Railway to its suburban residential developments, built speculatively along the route of its services.

2.3 Current Issues in Taxi Transportation

Within the literature of the last 30 years, transport, appears clearly defined and documented. The use of taxi services is a worldwide phenomenon that, despite variations in circumstance and geography, tends to revolve around the question whether to control, or liberalise taxi services. More correctly, to what extent control is imposed on the market for taxi travel. Documented examples of regulatory reform exist and specific to reforms in the USA (Leisey 2001), Australasia (Gaunt 1996) and some European markets (Marell and Westin 2002). Although separate in analysis, the literature tends to support argument of a cyclical approach to regulatory reform. Distinct geographical patterns have also emerged, particularly in the USA, which in part relate to the time sequence in which regulatory reviews have taken place.

The first of the ‘current’⁷ reforms to the taxi market took place in the USA, and are related to widespread deregulation (Cevero 1992; Jones et al. 1999) that took place during the late 1970s and early 1980s. In this period 22 US cities removed regulations impacting on taxi operations. Despite significant theoretical justification forwarded to support US deregulation⁸, the introduction of a liberalised framework to U.S. cities has courted a significant amount of controversy, with widely differing levels of ‘success’ following deregulation. Most of the US cities that introduced deregulation in the 1970s have returned to forms of regulated control. Distinct differences exist between Western USA, where deregulation has been largely followed by complete re-regulation, and the Eastern seaboard, where limited de-restriction continues in some cities (Teal 1992). Much of the subsequent analysis of US deregulation remains critical of its implementation, with a Price Waterhouse analysis (1993) of six⁹ US cities concluding that deregulation had resulted in a loss of service in short term, and lack of positive benefit throughout.

Further deregulation followed in the late 1980s, with New Zealand deregulating in 1989 (National Competition Council 2000) followed by Sweden in 1990 (Marell and Westin 2002). Many of the same arguments applied in the US, inefficiencies of entry control, mismatch of supply and demand were applied to Sweden and New Zealand. Marell and Westin, (2002, page 135) associate Swedish reform to a political viewpoint in which *By means of free competition, the deregulation was expected to yield positive effects for taxicab companies and their passengers.* Gaunt (1996 page 257) argues that, in New Zealand, there would be *significant new entry....* Gaunt also makes reference to desirable indicators or data sets allowing for review of wider regulatory reform, suggesting that *the ideal set of data does not exist.* Teal and Burgland (1987 page 39) identify very similar arguments relating to the earlier

⁷ Current reform is taken to relate to changes in regulation impacting upon or referenced within current reform. Regulatory reforms in the USA during the late 1920s and 1930s are not included in this assessment. A brief description of these reforms is given in the footnote of Teal and Burgland (1987 page 37)

⁸ Prevailing economic predictions prior to US deregulation were of falling taxi prices (tariffs) both because taxi license values would fall to zero, and because firms would have an incentive to use price as a basis for competition for patrons (Frankena and Pautler 1984).

⁹ The selection of cities for analysis impacts on the results of assessment. Most post-reform cities display similar characteristics of mature market, ie, changes have had time to ‘settle in’. Short time lapses between deregulation and analysis tends to be more favourable than medium term assessment.

American experience, as seen to support deregulation¹⁰. The rationale, they conclude, for arguments supporting deregulation (in the US) was threefold:

First it is alleged that restrictions have enabled incumbent firms to charge higher prices than those that could prevail in a non-regulated industry...

Secondly if the taxis in the industry are too few, as they may be under regulation, the increase in industry size that follows deregulation should improve the level of service to the customer... and

Third, most cities which regulate taxis only allow a single type of service, namely the exclusive ride taxi (ERT).

Similar concepts are outlined in Dempsey (1996) as being put forward in favour of deregulation, suggesting:

Government creates distortions which thwart market incentives for productivity, efficiency, and lower consumer prices. In a nation dedicated to free market capitalism, governmental restraints on the freedom to enter into a business or allowing the competitive market to set the price seem fundamentally at odds with immutable notions of economic liberty. While in the late 19th and early 20th Century, market failure gave birth to economic regulation of infrastructure industries, today, we live in an era where the conventional wisdom is that government can do little good and the market can do little wrong.

Both Dempsey and Teal & Burglund, identify issues arising from deregulation, including *a failure to achieve the objectives and outcomes... or to match expectations established in the lead into [US] deregulation....* These are seen as indicative of systemic failure in the market mechanism, identifying the existence of market failure in the supply of taxis.

In the UK, the most recent investigations of regulatory reform in the taxi industry are the current and ongoing assessments of the Office of Fair Trading (OFT 2003), the Scottish Executive (Scottish Executive 2003¹¹), and the Department of the Environment (DOE NI 2004¹²). Subsidiary issues of accessibility arise as impacts of the Disability Discrimination Act (1993) (DDA), and recent reviews establishing deregulated taxi services in Dublin, Republic of Ireland. Impetus for review in the UK originates from the DTi sponsored investigation of the Office of Fair Trading. For which the terms of reference included requirement to review both taxi and PHV services in all parts of the United Kingdom. The OFT report coincided with the parallel and concurrent review being completed by the DOE NI. The Northern Ireland Review has since delayed publication.

¹⁰ The Teal and Burglund paper itself tends to be critical of deregulation.

¹¹ Licensing of Taxi services in Scotland is a devolved matter of the Government of Scotland. This differs from Department for Trade and Industry (DTI) responsibilities in England and Wales. The Scottish Executive completed separate review of taxi services in Scotland following the OFT report, and under the auspices of the Civic Government (Scotland) Act 1982 et seq.

¹² DOE NI – Department of the Environment for Northern Ireland, Investigation concerning the Licensing of Taxi services; ongoing as at 12th July 2004.

The 2003 report of the UK Office of Fair Trading (OFT 2003) investigated many of the issues seen in previous assessment elsewhere. The report highlighted three areas in which control is applied specific to the operation of taxis, changes to which would accrue benefit to the travelling public. These relate to the safety (Quality Regulation) of a vehicle, the fare (Economic Regulation) that can be charged for the use of the vehicle, and the numbers (Quantity Regulation) of vehicles that are allowed to ply for trade. In its conclusions, the OFT considered that although it is necessary to retain regulatory oversight over the maximum price and safety of a vehicle, the existing quantity regulations in place in some cities acts against the public interest (lack of passenger gain) and should be removed (Cooper, et al 2003)¹³. Furthermore, evidence of negative impacts in other instances of regulatory reform, are considered, by the OFT, to be '*unrealistic*' (OFT 2003 (a) page 16). Other documented commentary specific to Dublin also tends to support passenger gains (Irish Times 2000), with the Irish Competition Authority (1998) identifying such gains as Pareto Improving.

Despite the established nature and longevity of some of the examples of regulatory reforms, surprisingly little unanimity exists in literature. Views tend to polarise between the two extremes of regulatory activity (Coffman 1977; Shreiber 1977). Differing datasets tend to support both short-term gain and long-term decline in equal measure, tending to reflect the conflicting views of free market or regulated approaches.

Gains and losses resulting from regulatory reform relate in part to market maturity. Short-term gains are particularly prevalent where secondary markets exist (Dublin), or grey markets (New York) in which private hire (minicab) services exist and are able to switch status from minicab to taxi with little difficulty. Some evidence also exists of cross boundary traffic movements, taxi services crossing from neighbouring administrations to take advantage of relaxed entry regulation¹⁴. Similarly problems of insufficient numbers of licensed taxis leading to illegal pick up by private hire vehicles are documented specific to some cities (including Glasgow and Belfast). Reports relating to recent change, such as the OFT (OFT 2003) citation of successful delivery in Dublin, market having experienced deregulation for a period of just one year at the time of OFT analysis, can be seen at best as a possible prediction of outcome. Similarly datasets that compare outcome need to be seen in relation to market maturity.

Balanced reviews of impacts of deregulation, and in some instances re-regulation, exist only in respect of mature markets, where impacts have settled to a form of market equilibrium. The US experiences are well documented, and often seen as not achieving levels of improvement (Leisey 2001) hoped for, and in some instances hostility. Unique market characteristics are also quoted as contributory to the lack of and/or restricted benefits in the US experience.

Despite widely differing interpretation, some agreement is achieved in the measures by which regulatory reform can be assessed. These include:

¹³ See Cooper, et al (2003). For a detailed review of OFT report no 676, and a response specific to Scotland.

¹⁴ Concerns of 'Dual plating' have been expressed at the Licensing Liaison meeting of Perth and Kinross council, meeting of the 15th July, 2004. Council Chambers, Perth, Scotland

- Change in the size of the industry
- Change in the cost of using a taxi
- Response time, and refusals / no shows
- Productivity

(Adapted from: Teal and Burgland 1987, and Gelb 1982)

The need to assess likely impact of change remains fraught with difficulty. Why, despite documented evidence suggesting longer-term negative impacts arising from deregulation, do authorities continue to seek to deregulate taxi operations? Is the continued move to change regulation indicative that neither fully regulated nor deregulated scenarios deliver ideal service characteristics? To what extent are differing attempts to alter regulation based on local circumstance, political, or economic dogma?

2.4 Policy, Regulation and Industry Employment

Consistent in both public statement, and documented manifestos, is the desire to achieve improvements in taxi provision to the public. What constitutes an improvement varies between increased supply, reducing prices (in real terms), improving quality, and increased accessibility. While current Scottish legislation¹⁵ meets some of the desired attributes, including ensuring sufficient supply through a requirement to demonstrate absence of significant unmet demand (SUD); some texts question the ability of current structures to fully meet customer expectations. The OFT (2003) concludes that free market entry will act to improve service levels is justifiable on the basis that free market entry would result in a sustained increase in vehicle numbers and availability, and that increased numbers of competitive operators would not impact on the quality or long term viability of the taxi industry, where necessary through the introduction of further legislated (Quality) requirements. Whether current evidence supports these outcomes is more questionable. Issues of interaction within the industry, and in particular the impact on employment is not covered in detail within the current review (OFT 2003), and receives even less attention in a wider policy forum. Absent is a detailed assessment of the impacts of proposed reforms on industrial employment, its knock on consequences; or any analysis of the ability to optimise supply through supply side management.

Industry employment impacts on taxi services in two distinct ways. The need to achieve what is (perceived to be) adequate income impacts on the fares charged to the passenger through the determination of tariff. Some cities (Edinburgh, London) include a driver income variable in cost models used in the determination of tariffs. Others (including Perth) do not model increased wages as part of tariff reviews¹⁶. Employment standards also impact on quality issues, where (Avants 1996) deregulation can create a vicious circle of declining incomes, declining quality standards, and gradual loss of levels of service felt desirable. Changes in prevailing policy impact on industry employment by affecting the ability of the operator to earn

¹⁵ Civic Government (Scotland) Act 1982

¹⁶ A common requirement for tariff determination exists under the Civic Government (Scotland) Act 1982, despite there being no set methodology or common standard for its assessment.

sufficient an income to sustain his/her employment. Changes in the economic balance of the industry will further impact on the ability of the industry to sustain quality standards of its own free will, or through the operation of a competitive market mechanism. Competitive pressures ensure an even approach to vehicle quality, where common vehicle standards are achieved, but do not legislate for improving standards where operating profits cannot sustain vehicle renewal (see Hampshire 1986).

The issue of lack of supply at key times, or inadequate supply, has been used in most literature as a cross the board indicator of effectiveness of taxi operations. In reality, however, any mismatch between demand and supply tends to be peaked reflecting the patterns of use of taxicabs in urban situations (Halcrow 2001; Cooper et al. 2003)¹⁷. Insufficient supply occurs regularly over a distinct but limited period of time (mainly Friday and Saturday nights), and may not reflect an inadequate level of employment per-se, but rather a specific problem in concentrating supply.

2.4.1 *Extent of inclusion of industrial employment in analysis*

Most reviews make reference (Halcrow 2001) to the impacts of changes in licenses on existing operators. Impacts are identifiable specific to income, varying between being a part of the assessment of costs in some tariff reviews, to an assessment of the hardship faced by drivers in deregulated environment is typical (O'Reilly Consultants 2002)¹⁸. At the core of the argument is the suggestion that a root cause of poor service is inadequate wages and poor working conditions. These in turn lead to high turnover of drivers further deteriorating the ability of the industry to sustain, let alone improve, the quality of service offered. Fraser of Allander Institute (1998) confirms a likely detrimental effect on the incomes of established drivers, confirmed in the work of O'Reilly Consultants (2002)¹⁸, suggesting resultant drop in taxi revenue will not allow adequate revenue to maintain fleets.

Schaller, et al (1995) makes a direct link between drivers within the fleet and the quality and safety of services. The divergence of interests between immediate supply gains, and the long-term structural stability of the industry is well illustrated by literature and in the experiences of the cities included in initial review with instances in the USA detailed in Leisy (2001).

Industrial employment issues in the UK taxicab industry are less documented than its US counterparts. The Halcrow Group (Halcrow 2001) assess employment issues in relation to the measurement of significant unmet demand¹⁹ (See also Fraser of Allender 1998). The issues are also raised in some methodologies adopted in the assessment of Tariff Cost models in Edinburgh (Cooper, et al. 2002, 2003). A conclusion arising from the Edinburgh studies is that an increase in the numbers of taxis does not necessarily increase supply at key times. The issue is not that there are

¹⁷ Halcrow (2001) demonstrates clear peaking in demand, typically high on Friday and Saturday nights where travel home from entertainment outstrips supply.

¹⁸ O'Reilly Consultants (2002), A range of views is expressed in literature specific to Dublin following the development of a hardship fund for drivers following deregulation of quantity.

¹⁹ Significant unmet demand is the measure of excess demand over current supply. It is a key measure in existing legislation in the maintenance of Restrictions to license quantity (Medallion Caps) in UK licensing authority areas.

enough taxis, rather that the available fleet is not being made available to the extent appropriate to match demand at key peak times. Measures introduced in the Edinburgh Tariff Reviews from 2002 and in recommended 'differential tariff tables' for 2003 seek to address differences in supply and demand profiles through proactive tariff measures. Calls from the Edinburgh taxi trade for a £2.00 supplement for Friday and Saturday night²⁰ mirror the concept, but may appear excessive.

A fundamental question must reflect the negative focus of assessments that address the impacts on drivers following changes. To what extent are negative employment impacts consequential to policy changes, and to what extent could the reverse be true. In short, can a measure which impacts positively on industrial employment also prove beneficial to the travelling public. To what extent is this contention observable in analysis to date, and to what extent would quantification of the impact of positive industrial employment measures aid in the development of taxicab transport policy in Scotland?

Section 3 Identification of data toward informed policy decisions

The apparent desire to address policies impacting on the taxi industry hinges on the question whether the current structures are delivering the best form of services appropriate to the users of a taxi across its many levels. Following on from this are questions whether the policy makers have an appropriate cross section of information sufficient to the determination of best practice or have appropriate indicators to assess the need to address policy issues; whether the policies in place are working, and what impacts might arise from a change in prevailing policy.

3.1 UK Indicators

Nationally in the UK, the licensing experience of the taxi industry has been brought into focus through the OFT report (OFT 2003) based on the perception within some consumer arenas that the industry is failing to deliver best service or value for money, though national and local visions and needs often differ²¹. Most critiques of the taxi industry cite achieving the best level of customer benefits as a primary indicator of taxi optimisation. This reflects the (somewhat contradictory) need for quality of services, adequate quantities of taxis at key times, and low tariffs. Timescale will also be significant in that some benefits accrued in the short term, competitive pressures on prices, may equally impact on long term sustainability.

Indicators can be identified in respect of policy measures that impact on the differing 'actors' and are summarised in respect of Passenger Benefit, Operators Impact, and Licensing Authority. An overview of indicators is given in Table 3.1. The range of indicators is felt important as it includes all players encompassing both short and longer-term impacts.

²⁰ Edinburgh Evening News, 6th February 2004, 'Drivers warn of less custom'

²¹ The issue of impacts of policy application at appropriate level (sometimes called subsidiarity) is discussed in Nelson et al 2004 (See also European Council 1992)

Table 3.1 Policy Indicators

	Indicator	Measurement	Source
Generic Measures			
0.1	Change in size of the industry	Total number of taxi and PHV vehicles	Licensing records
Measures Specific to Passenger			
1.1	Cost of Using a Taxi	2 Mile journey	Tariff Table
1.2	Waiting Time	At Rank Delay	SUD
1.3	Vehicle Quality	Qualitative Quantitative (Veh type)	Passenger Survey Observation Survey
Measures Specific to Driver			
2.1	Productivity	Miles driven in service	Operator records
2.2	Income		
Measures Specific to Licensing Authority			
3.1	Cost / Effectiveness	Cost Recovery	Licensing Authority
3.1(a)	Service Delivery	Response times	Licensing Authority

On a city scale, local practical issues are also pertinent in assessing the need for policy review, identified as policy drivers and barriers, the identification of which (and their relative importance) is likely to vary by location. Each indicator is defined in terms of user group, measurement, and method by which optimal delivery may be achieved. Secondary and external issues which may alter the effectiveness of each indicator are also considered.

3.1.1 Change in size of the taxi industry:

The measurement of the size of a taxi industry is a common measure used in the determination of success or otherwise in regulatory reform. Quantification is simple, as it relates to an overall number of plates in circulation, but may be misleading given total number of plates do not themselves reflect adequate service levels.

Related issues include the definition of the city's fleet of vehicles (the taxi parc). Whether it is appropriate to measure just public hire taxi fleets, or a global change to both taxi and PHV fleets (total numbers of taxi type vehicles) to ensure accurate representation of vehicles for hire. Matching the profile of demand to the profile of supply, it is suggested, may better represent optimal delivery. Improving services demonstrate a better match in time space as well as absolute numbers.

3.1.2 Cost of using a taxi

To the passenger, cost of use of a taxi is a directly observable indicator of the effectiveness of the taxi market. The indicator reflects the effectiveness of Quantity and Economic regulation, both through competitive market mechanisms in the free market and through economic control in controlled markets. Taxi cost of use reflect pre-determined tariffs set by or in agreement with the Licensing Authority. In both market instances, the indicator is clear and unambiguous. The construction of tariff in the UK typically includes a cost for engaging a vehicle (flag drop charge), and

increments for time and distance. The amount charged for flag drop and mileage vary significantly between cities. A common measurement of a 2 mile journey is often used (PHM 2003) in the comparison of tariff levels, as in most instances this will allow for levelling of flag drop to mileage based charges and represent an appropriate comparison.

In previous assessments, the measurement of changes in cost following deregulation in the USA (Teal and Burgland 1987) (Gelb 1983) a control factor for change in inflation, the Cost Price Index (CPI) has been applied to demonstrate change in real costs against changes in other goods. The measurement of costs in Scotland might also demonstrate change in relation to inflation, generally measured as a Retail Price Index (RPI), or as compared to equivalent industrial prices using Industrial Price Indices (IPI). Optimal systems may be expected to ensure appropriate setting of tariff reflecting the expectations of the passenger and need of the industry to sustain and improve the levels of service offered.

3.1.3 Waiting Time

Waiting time is included as an indicator because of its prevalence in some UK consultants' studies. The measure demonstrates delays encountered in engaging a taxi at rank, or by hailing on street, and has been used to demonstrate (the lack of) Significant Unmet Demand (SUD) (Halcrow 2001). Some methodologies appropriate to the measurement of SUDs (Halcrow 2003; OFT 2003) include excessive waiting time as indicative of the presence of SUDs. Other studies (Fraser of Allender) have not included waiting time, and determine the existence of SUDs on the basis of qualitative surveys.

Although seen as an important measure, there are discrepancies in the measurement of waiting time, and determination of the presence of significant unmet demand. The measurement of waiting time is determined as the length of time taken to engage a taxi most commonly taxi stance (Halcrow 2003 and OFT 2003) both Halcrow and the OFT employing a standard method, allowing for a 'normal' threshold in waiting before a taxi is deemed to be delayed, but differ on the definition of the threshold. The determination of acceptable delay is unclear, and probably differs between user groups and time of day, although this distinction is not made in the Halcrow study. An example of differential delays is illustrated in differing expectations for mid day services and peak demand. Optimal delivery would result in a reduction in normal wait for taxi services, and require improved definitions of these thresholds.

3.1.4 Vehicle Quality

Vehicle quality differs from the preceding indicators, in that its measurement is qualitative rather than quantitative, and requires local perception and interpretation of standards. This said, the measure remains highly appropriate to the analysis of reform in the Scottish Taxi market, given that the effect of regulatory change in other countries was a sudden and documented change in the quality of vehicles used as taxis. The measurement of vehicle quality requires the establishment of new indicators appropriate to its measurement, their calibration and identification of

optimal service levels. Some indicators exist, set out as vehicle standards in some cities under the Metropolitan Conditions of Fitness (MCF) and derivatives. These relate primarily to mechanical and technical minima, and would require extension in all instances to include quality measures.

3.1.5 Productivity

Taxi productivity has been defined as the productive time of a vehicle within its working day, or as a proportion of passenger miles against total mileage. Dead miles represent both a loss of income to the driver, and where driven (rather than waiting at taxi rank), additional pollution and contributor to congestion. Low levels of vehicle productivity are negative both to the environment, and to the income of the driver that, in turn, may impact on the ability of the operator to maintain or renew his/her vehicle. Passengers benefit indirectly where higher levels of productivity allow for vehicle maintenance, but conversely may suffer where productivity is achieved at the expense of adequate supply of vehicles.

The link between regulation and productivity is not as definite as linkages between quality, cost or numbers of licenses; as the licensing authority has no power to legislate for minimum hours within the industry. The link is dependant upon competitive operations – the numbers of vehicles plying for trade; and the internal structures of the trade, multiple drivers, radio ring sectors etc. Never the less, the measurement of productivity should be taken as an indicator of efficiencies within the industry, and the ability of the trade to function in given regulatory circumstances. Measurement of productivity, as percentage of miles driven in service, relies on a supply of accurate figures from the trade. Optimal regulatory frameworks, using the concept of Pareto optimization, would seek to increase productivity until such time as passenger benefit declined.

3.1.6 Income

The measurement of driver income is controversial in the assessment of successful regulatory reforms, as the desires of the public, licensing authority and driver may diverge as to what constitutes appropriate salary levels. The issue of driver income cannot, however, be ignored in the assessment of regulatory reform. Reducing incomes impact on the ability to maintain or renew fleet vehicles, while increased incomes may paradoxically reduce hours spent in service.

Driver income is currently measured in some cities as part of Tariff Reviews required on a regular basis under the Civic Government (Scotland) Act 1982. The inclusion of an income element is not mandatory, and highlighted only in a few detailed analyses (including Edinburgh). Moreover, as most tariff reviews deal with proportionate changes in costs rather than absolute measurement of operating cost, the measurement is not standard, or necessarily appropriate to the review of regulatory reform. Social optima may be achieved where income is maintained at a level at which service maintenance and vehicle renewals might be ensured, or increased as appropriate to absolute costs of production, until passenger benefits decrease. This implies establishing an absolute minimum appropriate to driver income.

3.1.7 Licensing

While most reviews have concentrated on passenger benefits few (if any) have considered impacts of changes in licensing structure on the licensing authority. The significance of impacts on the licensing authority reflect a number of factors; Pareto Optimisation within the sphere of all players, and in terms of knock on consequences within the industry. In both instances, the development of efficiencies in delivery reduces costs of licensing, and improves the ability of the industry to react, for example through rapid issuance of licenses and vehicle testing.

Two related indicators are seen as appropriate in measuring impacts arising from regulatory reform. These are

- a) Cost Recovery, and
- b) Response times

Measurement of cost of licensing can be monetary, ie, how much cost is borne by the taxi driver, and how much is borne by the local authority; or in terms of cost recovery, whether authorities operate at break even. Secondary measures relate to the effectiveness of the regime in delivering its responsibilities, in terms of speed of licensing, testing and permit issuance. The ability of the industry to operate legally is dependant upon the authorities ability to ensure appropriate response times. Optimal Licensing is felt to include timely and accurate service delivery, and might ideally include full cost recovery, dependant upon the local financial priorities.

The indicators suggested relate to differing elements of service delivery in the supply and use of taxis. Many have been developed and are in use in isolation, or specific to a particular element of current service delivery; eg, use of waiting times in the determination of SUDs. Other areas of analysis are rarely used, such as cost recovery, which has remained limited, in documentation, to some US city administrations. It is a combination of all appropriate indicators which, when applied together, allow for detailed comparison of regulatory scenarios.

3.2 Application of indicators

The ability of a scheme to deliver improving service standards is reliant upon optimisation across all relevant indicators. This is complicated by the fact that improvement in some indicators is dependant upon other activities. For example, reducing waiting times is dependant upon productivity, which is inversely dependant upon size of industry. Moreover, the values attached to differing indicators vary by user group and this implies a level of weighting by indicator. Indicator weightings are specific to local circumstance, and they require validation at the local level. A further question arises as to whether a solution achieves Pareto Optimising criteria, a trade off of benefit across all players; or is seen as Pareto Improving, optimal to one group (or a limited number of groups) where such improvement is seen as just.

Scottish cities operate a mix of regulated and partially regulated taxi operations. A range of scenarios including regulated and partially regulated services, reflecting the current provision across Scottish cities, allows for determination of base values for both types of operation. Using existing data collected in the City of Edinburgh it is possible to identify some of the impacts the alternative scenarios might have. A third scenario considering further reduction in regulation is also demonstrated in respect to Edinburgh. It is possible, however, to identify shortfalls in existing datasets in this appraisal.

3.3 Issues in the application of indicators

The Combined Indicators Taxi Model (CITM) uses a combination of new and existing indicators in the assessment of taxi scenarios. The approach benefits from a wider assessment than may be achieved by the use of indicators in isolation. Conflicting methodologies or differences in interpretation arising from previous studies have also been addressed in the development of the CITM model, and relate primarily to absolute versus available vehicles; fare levels and measurement of waiting time.

3.3.1 Numbers of Vehicles

The number of vehicles provides a direct and simple analysis of the state of the taxi industry at any one time. However, studies disagree in the measurement and interpretation of fleet size. The simplest method of measurement, numbers of plates²² issued may overestimate the size of a fleet, with some plates purchased for future use, or as a tradable commodity. Issues also arise (Goodbody 2001) in the determination of numbers of vehicles operating. Increased license numbers may perversely reduce the available fleet as vehicles move from multiple shift work to single shift operation, an experience of de-restriction in Dublin.

Based on experiences in Dublin, a concept of cab shifts (Goodbody 2001 page 38) is developed based on a reduction from double to single shift operation, a reduction in the Irish practice of ‘cosying’. In the context of Dublin, this still returns a net increase in cab shifts. However, the experience in large Scottish cities is of an overwhelming use of double and triple shifts, ensuring maximum utilization of taxi vehicles. A similar reduction to single shift supply is unlikely to net the same extent of increased cab shifts seen in Dublin. Local validation is required, specific to desire and ability to operate single shifts. A variation of the Dublin method is used in the development of the CTIM below.

Table 3.2 Available Cab Shifts, using Dublin Methodology

Vehicle Availability		Absolute numbers Taxi & PHV	%	Total Cab Shifts	%

²² Vehicle license plates physically attached to the vehicle

	2000	6,600	100	8550	100
	2004	9,900	150	11,385*	114

*Vehicle shift pattern derived from Goodbody (2001)

3.3.2 Fare Levels

A standard measure exists in the analysis of fare levels, based on a two-mile journey without congestion. The indicator is common in the trade press (PHM 2003), and exists in some of the cost model comparisons required in Scotland under the Civic Government (Scotland) Act (1982), see Cooper et al 2002 and 2003. The use of fares to determine improving taxi delivery arises as a benefit to the passenger, although reducing incomes resulting may reduce the effectiveness of the services in the mid to long terms. The measure is of limited value in instances where price competition is not perceived, or in particular instances where its effects are restricted to certain market niches, such as company account holders.

The effectiveness of price competition for at rank and on street engagement of taxis is, at best, questionable. Pre-set maximum tariff levels, in which passenger negotiation is seen as a key method of reducing fares, are unlikely to produce significant passenger benefit.

3.3.3 Waiting times

Waiting times exist currently as a measure in the assessment of Significant Unmet Demand, and act as a trigger to the issuance of new licenses. Any improvement in supply of taxi services should result in a reduction in the waiting times in engaging a taxi.

Measurement exists following a number of differing methodologies, models developed by the Halcrow Group (Halcrow 2003) have been applied to Scottish Cities including Edinburgh and Dundee. A similar methodology is adopted in the OFT report No. 676 (OFT 2003), however this differs from the Halcrow model in determination of thresholds for delay. Both Halcrow and the OFT determine delay on the basis of a single (differing) threshold. Dublin employs a further derivative of waiting delay distinguishing between at rank and pre-booked services, utilising the same threshold adopted in the OFT report (OFT 2003), but applied separately to both at rank and pre-booked vehicles. Other models exist which determine presence of Significant Unmet Delay on the basis of surveys.

The key factor demonstrated in the CTIM model is the use of consistent methodologies prior to and resulting from regulatory reform. In this instance figures from cities outside of Scotland (Goodbody 2001) indicate a reduction in the waiting times for taxis, summarised below in table 3.3.

The analysis of impacts on waiting times in further analysis should equally match thresholds to an expectation of reduced waiting by user group. A summary of the Edinburgh user groups is given in table A3.1.

Table 3.3 Waiting Times, using Goodbody Methodology

Waiting Times		Pickup within 5 minutes at rank	% change	Pre-booked within 5 minutes of time	% change
	1997	*		23%	100
	2001	84.3%		47.5%	207

Sources:

Goodbody (2001) derived from tables 3.3(Pre-booked) and 4.2 (City Centre Ranks)

* Not available

3.3.4 Vehicle Quality

Changes in the regulation structures are documented (Goodbody 2001), to impact on the actual and perceived quality of vehicles in services. Many USA experiences have been of deterioration in vehicles standards, although passenger expectations of vehicle quality have also changed. Two measures are commonly applied, age of vehicles in service, and passenger perception of quality. The first being quantitative, the latter qualitative.

The assessment of quality is not felt to imply lack of safety within the taxi fleet, rather vehicle types contributing to the passenger environment. Decline in vehicle quality impacts negatively on the passenger regardless of the safety of the vehicle.

Table 3.4 Vehicle Age following deregulation

Waiting Times		Vehicles aged in excess of 5 years from 1 st registration	% change
	1997		
	2001	60.5%	

Source: Dublin Corporation

3.4 Variable Weighting

Application of policy will often reflect local circumstance, in which city and regional priorities are taken into account in reform. This is borne out in the devolved administrations of the UK, with responsibility for taxi service provision and control devolved to the Scottish Executive, and the other regional administrations. Weighting of indicators allows for scenario testing in line with regional and local circumstance.

Indication of appropriate weightings is given in respect to the City of Edinburgh, based on small-scale analysis.

Section 4. Scenario Building

Scenario building is intended to provide an indicative overview of impacts arising from given policy scenarios. Each scenario represents an alternative approach, in this instance to the delivery of taxi services in Scotland. An illustrative scenario has been developed representing an alternative policy approach as set out in table 4.1.

Table 4.1 Scenarios for Testing

Scenario	Economic Regulation	Quantity Regulation	Quality Regulation
Regulated	Tariffs Set	Maintenance of restriction	Safety Minima
De-restricted	Tariffs Set	Open Access	Safety Minima

4.1 Informing policy scenarios

Policy scenario testing is intended to allow for fine-tuning of policy application, improving outcomes following the principle of Pareto optimisation. Each location will operate under differing conditions, a result of which being that solutions appropriate to application in Central Scotland may not be appropriate to application in non-metropolitan cities or non-urban districts.

For each location a common framework is proposed, and tested in this study in relation to the City of Edinburgh. A base scenario reflecting current policy application is compared with an alternative (or number of alternatives) derived from key questions:

- What is defined as a policy?
- At what level is the policy being made
- Who does it affect
- How can it be improved

4.1 Scenario 1 (Do Nothing)

Regulated services exist in many of the larger Scottish Cities and Towns. Regulation is applied to Tariffs (Economic Regulation), Numbers of Vehicles (Quantity Regulation) and to Vehicle Standards (Quality Regulation).

Testing the combination present in many cities against the indicators is intended to demonstrate current satisfaction with the provision of taxis, and provide baselines against which alternative scenarios may be assessed.

4.2 Scenario 2 (Do Something)

An alternative to the fully regulated operations in place in larger cities, is to allow open access to taxi drivers, whereby any drivers wishing and capable of operating vehicles are able to do so. De-restricted policies exist in place in some larger cities, including Dublin and in some areas of Belfast, but are more common in smaller UK towns and districts.

Indicative data exists in relation to the impacts of de-restriction in relation to Dublin, and historical data from US experiences in the 1970s and 80s.

4.3 Alternative Scenario testing

While the study has considered the impacts of three scenarios representing a cross section of regulatory approaches, a number of alternative combinations, and subsets of analysis exist within the alternative approaches to regulation. These may include:

- Variation to the quality regulations, eg, the inclusion of vehicle type and age
- Variation in Economic Regulation, eg, to encourage below price competition

A third test may include full deregulation applying where full market forces impact on both quantity and economic aspects of operation. A completely deregulated operation would also remove safety minima. This, however, is not realistic as all authorities maintain a legislated minimum vehicle standard, similar to the MOT and PSV tests in the UK.

Indicative data exists in relation to the impacts of deregulation arising from experiences in the USA, New Zealand and Sweden.

Section 5 Assessment of Policy Scenarios

The primary aim of this study has been to identify key data required in the development of taxi services in Scotland. An initial test using existing and new datasets collected on a small scale in the City of Edinburgh are included below. It is also significant to identify areas where datasets do not exist, or where conflicts arise between user groups and key players. The study adopted a number of key principles in setting out policy scenarios for testing. The aim of policy enhancement is felt to provide both short and longer-term benefit to the travelling public. Short-term gains may not fully represent the best interests of the long-term stability and development in the industry.

Policy testing has been based on the principle of achieving Pareto Optimality, increased benefit across all parties. Pareto Optimisation, and Pareto Improvement are identified as appropriate to achieving best levels of service in some transport modes, and would equally be applicable to the taxi industry, as a form of multiobjective optimal solution. The Pareto Improving scenario is more achievable in that it relies on

just solution rather than no loss solution, but is more difficult to sustain argument specific to what is just.

5.1 Analysis

Within the constraints of this study it has not been possible to obtain a full cross section of indicator values. Some are restricted by commercial sensitivity, or beyond the scope of the work. The model is set out, however, given a full set of variable fields as the basis for further development and analysis. Results based on the partial dataset should be treated as indicative, and conclusions drawn against the caution of limited inputs.

Having identified scenarios as the most appropriate for policy application, the study considered the likely impacts across all indicators of their application. Data specific to the City of Edinburgh is used in the development of the baseline, while datasets are drawn from other case studies in the instance of proposed reforms to the regulatory framework. It has not been possible to test against all indicators with some values being restricted through commercial sensitivities. However, the accuracy of analysis increases the broader a range of indicators used.

Impact values specific to the user groups are included to provide an indication of the likely impacts on the various key players. A weighting specific to circumstance, and expectations e.g.: whether an authority wishes to maintain rigid Metropolitan Conditions of Fitness, would provide a further indicator for local application.

Table 5.3 Summary of Scenario Tests, applied to Edinburgh

Indicator		Do Nothing	Do Something	Passenger Impact (1)	Driver Impact	LA Impact
Change in size of industry	Licenses	1215	1823	1	2	1
	Cab Shifts	3000	3420	1	2	1
Cost of using taxi 2 mile journey		4.04	4.04	2	2	2
Waiting Time	At Rank	8.77	N/A	N/A		N/A
	Pre-booked		4.36	1	2	1
Vehicle Quality (Age) (1)		4 years	5.02 years	3	3	3
Vehicle Quality (Type) (2)		All MCF	All MCF	2	2	2
Driver Productivity		N/A	N/A	N/A	N/A	N/A
Driver Income (3)		16,000	15,136	2	3	2
Cost Effectiveness		N/A	N/A	N/A	N/A	N/A
Service Delivery		N/A	N/A	N/A	N/A	N/A
Average Impact Values				1.7	2.3	1.7

(1) Impacts: 1 – Positive, 2 – Neutral, 3 – Negative, N/A – insufficient data

Section 6 Conclusion

Developing and applying the Combined Indicators Taxi Model has established a wide range of impacts and indicators appropriate to the assessment of taxi services in Scotland, and in wider application. Short-term passenger gains do not appear to equate to long-term industry stability, or to a continued improvement in passenger service. The desire to achieve optimal service delivery would logically suggest both short and long term gain.

Indicators appropriate to the full assessment of differing scenarios make use of data and datasets specific to key market participants, and have not (in some instances) been developed as a part of previous analysis. The ability to assess a broader spectrum of impacts requires the further development of indicators within the modelling framework.

Within the constraints of existing datasets and small-scale survey, two regulatory scenarios have been tested using the CITM. Alternative structures are compared to highlight positive policy directions in the provision of taxi services.

6.1 Policy Direction in the provision of taxi services

Policies specific to the Scottish Taxi trade, originating at Executive and Licensing Authority level, are fundamental to the longer-term stability and sustainability of the industry. Such policy instruments require an essential input of appropriate data for assessment, and informed review of impacts pertinent to the circumstances apparent in Scotland. It is a firm conclusion that the differences between stated objectives of deregulation, and the observed impacts in US cities cited highlight fundamental difficulties in adopting purely free market economic solutions to provision of adequate supply. In many instances, the concept of deregulated supply does not address market failure or ensure levels of service visible prior to deregulation. Moreover, the lack of data specific to tariff and supply side approaches to meeting demand has resulted in these measures not being considered proportionately.

The development of a deregulated or derestricted taxi policy will not in itself produce the level of benefits across all players consistent with the long term development of the taxi industry in Scotland. Whether a Pareto Optimising or Improving criteria is adopted, long term impacts within the industry are likely to reduce the overall benefit to the passenger, or create an industry which will require review in the future to accommodate negative as well as positive impacts of the policy change.

Alternative policies not tested within the scope of this study may prove more beneficial to the longer-term interests of the travelling public, and to the other market participants. These should include considerations as to how the industry may be made more effective within the constraints of the policies already in place. Benefits demonstrated as beneficial to some, but not all, market participants, may form the basis of further analysis in fine-tuning policies to achieve optimal criteria. An example of this might include measures intended to increase supply at certain times,

minimum service criteria, and the adaptation of waiting time criteria to reflect a time specific threshold, rather than a one value fits all approach.

Many of the policy reforms applied to other areas of public transport operation have resulted in identifiable benefits to the travelling public. By identifying methods of assessing changes within the taxi industry it may be possible to effect a long term growth in the importance and contribution of the taxi industry.

Key points drawn out of the research include:

- Market approaches vary between competitive (free entry) and regulated (licensed).
- Reviews of regulation tend to be cyclical with reform (where applied) tending to political economic dogma.
- There is no common view of detailed assessment criteria under which taxi related policies could be reviewed.
- The issue of passenger benefit is consistently forwarded in support of reform (for both free and regulated markets).
- Justification of policy reforms often address short-term gain, and fail to consider longer-term impacts on the structure and sustainability of the industry.
- Review of medium and long-term reform should be appropriate to all impacts to the user, within the industry and in relation to the administration of the industry.
- Data specific to the measurement of short term benefits of reform is partially available by city, but is not consistent, and would need to be enhanced and standardised
- Data specific to the assessment of medium and long-term impacts is not available on a consistent basis.
- Demonstration of long-term benefit and impact is possible using a wider spectrum of analysis than currently demonstrated in case specific reviews.

Section 7 References

Fraser of Allander Institute (1998).

Atkins, P. J. (1993), How the west was won: the struggle to remove street barriers in Victorian London. In *Journal of Historical Geography*, July 1993, Vol 19, No. 3, pp265-277

Avants, et al. (1996), 'Peer review of Seattle Taxicab Regulations. Report for the City of Seattle', <http://www.pan.ci.seattle.wa.us/seattle/leg/drago/peer1.htm>

Balcombe,R.J., Hopkins, J.M., and Penet, K., (1988), Bus Deregulation in Great Britain; A Review of the First Year, Research Report 161, Crowthorne, Transport and Road Research Laboratory.

Barett, S. D. (2000), Bus deregulation in Ireland. Published in response to A New Institutional and Regulatory Framework for Public Transport (Department of Public Enterprise, August 2000), Trinity College, Dublin, Republic of Ireland

Bly, P. H. (1987), Managing public transport: Commercial profitability and social service. In *Transportation Research Part A: General Volume 21, Issue 2* , March 1987, Pages 109-125

Bonaiuto M., Fornara F., and Bonnes M, (2003) Indexes of perceived residential and neighbourhood attachment in urban environments, in *Landscape and Urban Planning* 65 pp 41-52

Buchan, C. (1963) *Traffic in Towns – A study of the long term problems in traffic in Urban areas*, HMSO 1963

BSD consultants (1999), 'Review of the Western Australian Taxi Industry. Prepared for Department of Transport, Western Australia',

Buchanan, C. (1963) *A Study of the Long Term Problems of Traffic in Urban Areas*, Her Majesty's Stationery Office, London, England, 1963

Cairns, R. D., and Liston-Heyes, C. (1996), 'Competition and regulation in the taxi industry', *Journal of Public Economics* 59:1-15, 1996

Cairns, M. (1998), The development of Park and Ride in Scotland, in *Journal of Transport Geography*, Vol. 6 Issue 4, pp 295-307

Camangi R., Gibelli, M. C., and Rigamonti, P. (2002), Urban Mobility and urban form, the social and environmental costs of different patterns of urban expansion. In *Ecological Economics*, No. 40 pp 199-216

Cevero, R. (1992); Stimulating Transportation Alternatives in Response to Congestion Pricing, FHWA Congestion Pricing Symposium, Washington, D.C., 1992

Civic Government (Scotland) Act (1982),

Choong-Ho Chang (1998), Taxi Deregulation: International Comparison. Student Dissertation, Institute for Transport Studies, University of Leeds.

Coffman, R. B. (1977), The Economic Reasons for Price and Entry Regulation of Taxicabs, A Comment. In the Journal of Transport Economics and Policy, Volume XI, No 3 pp 288-297

Cooper, et al. (2002),

Cooper, et al. (2003), Response to the Office of Fair Trading Report, the Regulation of Licensed Taxi and PHV Services in the UK, Prepared by on behalf of The Scottish Taxi Federation.

Cooper, et al. (2004), 'Taxicab, specialized mode or the Key to integrated transit?' in Traffic and Transportation Studiess (Baohua, M., Zonghong, T., and Quanxin, S. Eds), Science Press, Aug 2004, pp 28 - 35

Costa, A. (1996), The organisation of Urban Public Transport Systems in Western European Metropolitan Areas, in Transport Research A, Vol 30, No. 5 pp349-359

Costelloe, D., Mooney, P., and Winstanley, A. (2001), When is the next bus. In *The Irish Scientist*, 2001 Yearbook.

Dempsey, P. S. (1996), The Revolving Door: a review of taxi industry regulation and reregulation, the paradox of market failure. In Transportation Law Journal [Vol 24, No.1]

European Council (1992), Minutes of the meeting of the European Council of Ministers, Edinburgh, December 1992

Flores-Guri, D. (2003) An Economic Analysis of Regulated Taxicab Markets Review of Industrial Organization December 2003, vol. 23, no. 3-4, pp. 255-266

Frankena, M., and Pautler, P. (1984), An Economic Analysis of Taxicab Regulation, Bureau of Economics, Federal Trade Commission.

Gaunt, C. (1996), The impact of taxi deregulation on small urban areas: some New Zealand evidence. In Transport Policy, Vol 2 No. 4 pp257-262

Gelb, P. M. (1982), Taxi Regulatory Revision in Portland, Oregon: A Case Study. US Department of Transportation, Report No., UMTA-MA-06-0049-82-7

Goodbody (2001), Goodbody Economic Consultants, Review of the Taxi and Hackney Market (Demand and Supply), January 2001, on behalf of The Joint Taxi/Hackney Committee of the four Dublin Local Authorities

Goodbody (2001)(b), Goodbody Economic Consultants, Study of The impact of Liberalisation on the Dublin Taxi Market October, 2001

Hai Yang, Wong, S. C., and Wong, K. I. (2002), Demand–supply equilibrium of taxi services in a network under competition and regulation. In Transportation Research B, No 36, pp799-819

Halcrow (2002), ‘City of Edinburgh Council - Taxi Licensing - Survey of Demand’, City of Edinburgh Council, 2002

Hampshire County Council (1986), Local Bus Services – Vehicle Age Criteria, Report to the Public transport sub-committee, 11 March 1996. Available at: <http://www.hants.gov.uk/scrmxn/c19065.html>

Han, S (2003), Dynamic traffic modelling and dynamic stochastic user equilibrium assignment for general road networks. In Transportation Research B, Vol 37, No. 3, pp225-249

Holvad, T., (2003), Public transport provision in two European cities – Oxford and Odense. In World Transport Policy and Practice, Vol 9 No. 1 pp26-30

Huisman, T. and Boucherie, R (2001), Running times on railway sections with heterogenous train traffic. In Transportation Research B, Vol 35, No. 3, pp271-292

Irish Competition Authority (1998), Solving Dublin’s Taxi Problems. Discussion Paper No. 6.

Irish Times (2000), Article Saturday, November 18, 2000 ‘Molloy plans 700 more taxis before Christmas’ Alison O’ Connor, Political Reporter

Ison, S., and Rye, T. (2003) Lessons from travel planning and road user charging for policy making, in Transport Policy 10, pp 223-233

Judicial Review (XXXX), City of Dundee vs. Dundee Taxis

Jones, F. R., Chu, X., and O’Donnell, R. (1999), A review of the method and structure of taxicab regulations in representative communities in Florida and other states. University Working Paper, University of South Florida, Tampa, June 1999

Langridge, R. J. (2002), Unprofitable rural bus services: Market structure & tender prices since Deregulation. In World Transport Policy and Practice, Vol 8., No. 4, pp 20-26

Leisy (2001), Taxicab regulation in Seattle, Lessons Learned, Document produced for the City of Seattle

MACS (2003) - Mobility and Access Committee for Scotland

<http://www.macs-mobility.org/docs/consult/macs/2004/msword/2004.doc>

Marell, A., and Westin, K. (2001), The effects of taxicab deregulation in rural areas of Sweden. In *Journal of Transport Geography*, No 10, pp135-144

Mollina, L. (2004), Minutes of meeting with Leon Mollina, City of Fresno, California, January 2004.

National Competition Council (2000), Improving our taxis, AusInfo, Canberra, Autumn 2000

Nelson, J., Cooper, J., Brake, J., and Wright, S (2004) RELU14, Rural Community Sustainability: Identifying Innovative Transport Solutions to Ease Direct and Indirect Policy Impacts. Research Development Paper, University of Newcastle, Not Published

OFT (2003), Office of Fair Trading , The regulation of licensed taxi and PHV services in the UK. Report 676, November 2003

OFT (2003) (a), Office of Fair Trading , The regulation of licensed taxi and PHV services in the UK. Report 676, Annexe G November 2003

O'Reilly Consultants (2002), 'Whether consumers are best served by regulations that restrict the numbers of taxi licenses', For the OFT

Ogus, A. (2002), Comparing regulatory systems, institutions, processes and legal forms in industrialised countries. University of Manchester, Working Paper Series, No. 35, Dec 2002

PHM (2003), Tariff Comparisons between GB cities. Published monthly. Private Hire Monthly, Trade Journal.

Price Waterhouse (1993), Analysis of Taxicab Deregulation and Re-regulation, Final Report for the International Taxicab Foundation, Washington DC., November 1993.

Railways Act (1993),

Raux, C. and Odile (2002), How can road tolls serve urban policy, in *Recherche Transports Securite*, No. 75, pp115-130

Revill, G. (2001), An Historical Geography of railways in Britain and Ireland & Railways and the Victorian imagination. In *Journal of Historical Geography*, April 2001, Vol 27, No. 2 pp291 - 293

Romilly, P. (1999), Substitution of bus for car travel in urban Britain, in *Transportation Research Part D* No. 4 pp109-125

Rye, T., and Wilson, N., (2001), The Urban Bus Situation in the UK: Recent Developments and a Case Study of Edinburgh. Napier University.

Schaller, et al (1995), 'Factors of production in a regulated industry: New York taxi drivers and the price for better service', *Transportation Quarterly*, 49(4) 1995

Schaller (1998), 'Issues in fare policy. Case of the New York taxi industry' *Transportation Research Record* 1618, 1998

Schaller (1999), 'Elasticities for taxicab fares and service availability'
www.schallerconsult.com

Schroeter, J.R. (1981), Taxicab profitability and service quality in the radio dispatch mode: the effects of fare structure and fleet size regulation. UMD DA8211540, in *Transportation Research A*, Vol 18, No. 3 May 1984, pp259

Shreiber, C. (1977), The Economic Reason for Price and Entry Regulation of Taxicabs. In *Journal of Transport Economics and Policy*, Vol XI, No 3. pp 298-304

Silva, E., (1998), Barriers to Urban Policy Implementation, (un)strategic planning in Cochabamba, Dissertation Paper, Department of Geography and Program in Planning University of Toronto 1998

Spencer, A. H. and Andong, W. (1996), Light Rail or Busway? A comparative evaluation for a corridor in Beijing. In *Journal of Transport Geography*, Vol 4. No. 4, Dec 1996, pp239-251

Teal (1992), 'An overview of the American experience with taxi deregulation' *International Conference on Taxi Regulation*, Montreal 1992

Teal, R. F. and Burglund, M. (1987), The Impacts of Taxicab Deregulation in the USA. In *Journal of Transport Economics and Policy* Volum XXI, No 1, pp37-56

The Transport Act (1985),

Toner (1996), 'The economics of taxicab regulation: A welfare assessment.' *Transport Policies - Selected Proceedings of the Sixth World Conference on Transport Research* 3.

Trotter, S. (1985), The price-discriminating public enterprise, with special reference to British Rail. In *Journal of Transport Economics and Policy* No 19, pp41-64

Trudel (1995), 'The fundamentals of taxi regulation and the Quebec experience', 7th Congress of the European Taxi Confederation, Spain., 1995

Tyson, (2001), Deregulation, the transport authority response. In *Public Transport International*, No. 2 pp 14-17

Van Vuuren, D. (2002), Optimal pricing in railway passenger transport: theory and practice in The Netherlands. In *Transport Policy*, No. 9 pp95-106

WBTPOA (2004), West Belfast Taxi Operators Association, minutes of meetings with the association, 16 September 2004

Appendix 1 Baseline Test

The baseline test (Do Nothing Scenario) allows for initial values to be attributed to an existing situation. These are demonstrated below in table A1. Quantitative values apply to most indicators, while qualitative values appropriate to the assessment of vehicle comfort, vehicle type are 'scored' according to an indicative measurement. Exact values applied to qualitative scoring will vary by location, and require additional validation.

Table A1 Test Results

Indicator	Data Source	Impact	Values applied to Edinburgh
Change in size of industry	Halcrow 2001 Halcrow 2001	Baseline Figure Cab shifts	1215 3000
Cost of using taxi 2 mile journey	Tariff Table	Baseline Figure	£4.04
Waiting Time	Halcrow Study	Baseline Figure	8.77 minutes
Vehicle Quality (1)	Survey Average Age	Baseline Figure	4 years
Vehicle Quality (Type) (2)	Observation	Baseline Figure	All MCF compliant
Driver Productivity	Survey	Baseline Figure	80%
Driver Income (3)	Cost Model	Baseline Figure	£16,000
Cost Effectiveness	Licensing Records	Baseline Figure	Not currently available
Service Delivery	Licensing Records	Baseline Figure	Not currently available

Notes:

- (1) Vehicle age is taken as a surrogate for Vehicle Comfort
- (2) Vehicle types are defined in 3 categories:
 1. Fully MCF compliant (eg, TX1, TX2 and Metrocab)
 2. Largely MCF compliant (eg, Eurotaxi, E7)
 3. Not MCF compliant (eg, Saloon vehicles in taxi service)
- (3) Derived from City of Edinburgh Council Taxi Tariff Review (2003)²³

²³ See Cooper et al 2003

Appendix 2 De-Restricted Test

De-restriction of quantity licensing removes barriers to entry imposed by restricted numbers of licenses. Other restrictions may remain in place, or be introduced to ensure continuity of services.

Datasets exist in relation to de-restricted policy application in Dublin, in the Republic of Ireland, and in some US cities. Few cities adopt consistent measurement of impacts, prompting adoption of observed change as primary indicator in this study.

Table A2 Test Results

Indicator	Data Source	Impact	Values applied to Edinburgh
Change in size of industry	Dublin	Taxi Licenses	1823
		Cab shifts	3420
Cost of using taxi 2 mile journey		No noticeable change	£4.04
Waiting Time	At Rank	Figures not available	
	Pre-booked	Improvement of 207%	4.36 minutes
Vehicle Quality (Comfort) (1)	Average Age	Increase in vehicle age from Over 55% vehicles over 6 years old	5.02
Vehicle Quality (Type) (2)			
Driver Productivity			
Driver Income (3)			15,136
Cost Effectiveness			
Service Delivery			

Appendix 3 Tabulated results from analysis

The study used a combination of indicators developed through survey specific to Edinburgh, and by interpretation from other cities' experiences to assess the impact of partial reform on the City of Edinburgh.

The closest example of de-restricted practice comparable in terms of city size and structure is that of the City of Dublin, Republic of Ireland.

The resulting figures have been applied in the testing of a deregulated scenario for Edinburgh, and compared to baseline figures drawn from current practice. Appendix 3 details the assumptions made in developing comparative figures.

A3.1 Increase in taxi availability

Based on experiences in Dublin, a concept of cab shifts (Goodbody 2001 page 38) is developed based on a reduction from double to single shift operation.

Edinburgh experiences an overwhelming use of double shifts, ensuring maximum utilization of taxi vehicles. A similar reduction to single shift supply is unlikely to net the same extent of increased cab shifts seen in Dublin.

Local validation is required, specific to desire and ability to operate single shifts. A variation of the Dublin method is used in the development of the CTIM below.

Table A3.1.1 Available Cab Shifts, using Dublin Methodology

Vehicle Availability		Absolute numbers Taxi & PHV	%	Total Cab Shifts	%
DUBLIN					
	2000	6,600	100	8550	100
	2004	9,900	150	11,385	114

Table A3.1.1a Extrapolation of Available Cab Shifts to Edinburgh

Vehicle Availability		Absolute numbers Taxis	%	Total Cab Shifts	%
EDINBURGH					
	Pre-reform	1,215	100	3000	100
	Post-reform	1,823	150	3420	114

A3.2 Cost of using a taxi

In the reforms applied in Dublin, and considered for the UK in the OFT report, price controls are felt appropriate and have remained in place as price maxima. This is intended (OFT 2003) to allow for the customer to negotiate a price. There is no evidence specific to the case study areas that this has occurred.

A3.3 Waiting Times

A logical conclusion of increased taxi licenses would be a reduction in waiting times experienced in engaging a taxi. The reduction reflects the importance placed by Edinburgh respondents (Table A3.3.1) on the availability of taxis. 80% of respondents consider availability an issue during the day, (93% being satisfied with availability), while 95% of respondents consider nighttime availability significant (69% being satisfied by numbers of vehicles available at night).

Impacts arising from reform in Dublin demonstrate a significant increase in vehicle availability in the pre-booked sector (a doubling of vehicle punctuality). No comparable figures are available for at rank punctuality.

Table A3.3.1 Waiting Times, using Goodbody Methodology

Waiting Times		Pickup within 5 minutes at rank	% change	Pre-booked within 5 minutes of time	% change
	1997	*		23%	100
	2001	84.3%		47.5%	207

Sources:

Goodbody (2001) derived from tables 3.3(Pre-booked) and 4.2 (City Centre Ranks)

* Not available

A3.3 Vehicle Quality

Vehicle Age distribution is used as a surrogate for quality impacts arising from regulatory reform. Surveys differ in the methodology and descriptions of vehicle ages, Edinburgh using an average age, although an indicative distribution has also been developed from a small dataset.

Table A3.3 Vehicle Age Distribution by year of first registration, Dublin 2001

Year	Proportion of Taxis
	%
Prior 1990	4.1
1990-1992	18.7
1993-1995	32.7
1996-1998	28.3
1999-2001	18.2
Total	100.0

Source: Dublin Corporation
Average Age of Vehicle: 5.02 Years

Table A3.3a Vehicle Age Distribution by year of first registration, Dublin 1997

Table A3.3b Impact on average age of vehicles

Average vehicle Age	Dublin	Edinburgh
Prior to deregulation		4.00
Following deregulation	5.02	5.02(1)

(1) Prediction

A3.3.1 Consumer Attitude Surveys

Table 3.3.1 Satisfaction with Edinburgh Taxi Service

'In my experience, Edinburgh taxis ..'		'It is important to me that Edinburgh taxis ..'		
Agree	Disagree		Important	Not important
98	2	Are clean	95	5
96	5	Get me to my destination on time	95	5
95	5	Are comfortable	92	8
93	7	Are available during the day	80	20
92	8	Are safe	95	5
87	13	Are punctual when booked	94	6
86	14	Are easy to book	94	7
69	31	Are available at night	95	5
48	53	Give value for money	93	7
29	71	Are cheap	80	20

Table 3.3.1a Satisfaction with Dublin Taxi Service

Cabs are of good quality	2001		1997	
	Taxi %	Hackney %	All Cabs	All Cabs
Agree strongly	17.8	19.1	17.8	6.7
Agree	59.9	53.7	58.8	60.8
Neither agree or disagree	10.4	12.5	11.7	21.8
Disagree	9.5	10.3	9.4	5.2
Disagree strongly	2.4	4.4	2.7	5.9
Total	100	100	100	100

Source: Bank survey

A3.4 Driver Income

Relatively few studies investigate the impact of regulatory reform on driver income, although most drivers comment on the loss of earnings following such reforms. Given the scarcity of such information, it is not possible to draw conclusions specific to driver income on this basis.

Alternative methods of analysis exist, and are included in some of the cost models adopted for tariff review, including that of the city of Edinburgh. In this instance, wages are included as an element in the determination of total operating costs, and have been set in previous reviews at £16,000 (See Cooper et al. 2002 and 2003).

Two factors are applied in the determination of total income, increase in the level of taxi use, and distances raising the overall income of the industry; and reduction of income through increased numbers of cab shifts.

Table A3.4.1 Changes in taxi use (Dublin)

	Taxi	Hackney	All Cabs	All Cabs
Frequency of Use	2001	2001	2001	1997
	%	%	%	%
Daily/more often	1.8	0.7	1.4	0.7
Every 2/3 days	12.3	15.6	11.5	6.7
Every 4/5 days	5.4	5.2	4.4	5.8
Once a week	37.7	37.8	33.7	28.6
Once a month	28.3	27.4	24.3	30.7
Less often	18.5	13.3	24.6	28.7
Total	100	100	100	100

Source: Goodbody 2001

Table A3.4.2 Changes in taxi distances (Dublin)

	Taxi	Hackney	All Cabs	All Cabs
Distance	2001	2001	2001	1997
	%	%	%	%
< 1 mile	2.1	2.9	2.3	2
1-3 miles	27.5	27.9	26.6	18
3-5 miles	18.9	20.6	19.8	38
5-7 miles	17.8	16.2	17.2	24
7-10 miles	22.2	25	23.1	18
10 miles +	11.5	7.4	11	5
Total	100	100	100	100

Source: Goodbody 2001

A3.5 Developing User Specific Thresholds

Trip purposes were coded as travelling on work or business, travelling to or from work, visiting friends, travelling to or from entertainment, travelling from hospital, from shopping centre or travelling to or from other transport. Table 3.5 gives the proportions for each of the three travel modes - taxi, bus and car - reported by this sample.

Table A3.1 Trip Purpose by mode Edinburgh

{PRIVATE}[Column %]	Taxi	Bus	Car	Total
Work/business	23	11	25	21
To/from work	2	4	2	2
Visit friends	14	28	18	18
To/from entertainment	33	27	27	31
From hospital	7	5	10	7
From shopping centre	10	18	16	13
To/from transport	11	8	3	9

Dublin

Journey Purpose	Taxi % 2001	Hackney % 2001	Don't Know	All Cabs 2001	All Cabs 1997
Business and work	9.2	10.3	1	9	7
Shopping	11.9	8.1	5.4	10.4	6
Social and recreational	64.4	66.2	78.4	65.9	67
Personal and VFR	6.5	8.8	8.1	7.3	17
Travelling to transport terminals	6.2	4.4	5.4	5.7	0
Other	1.8	2.2	0	1.8	3
Total	100	100	100	100	100

Source: Goodbody (2001(b))

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Subject:
Author: James Cooper
Keywords:
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