

**YARDSTICK COMPETITION IN THE NHS WHERE
'COMPETITION' HAS BEEN ABOLISHED**

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I INTRODUCTION

A textual analysis of official documents on the 'New' NHS would probably identify a defining innovation as the absence of constructive reference to 'competition' and its replacement with a statutory requirement to 'co-operate'. Under certain conditions, competition generally serves to promote efficiency in production. It could be argued that there was never much faith that competition in the NHS would be strong enough to drive efficiency improvements by providers. The Treasury's reliance on the old purchaser efficiency index can be seen as an attempt to produce a fall-back mechanism given the expected weakness of competition in this sector.

Economic theory is clear on the conditions necessary for competition to drive producer efficiency gains but there is limited theoretical work that can be used to predict the conditions under which *co-operative* behaviour will generate cost-reducing efficiency gains. Although game theory, transactions cost economics and strategic management theory all suggest there may be benefits to be gained from collaboration between firms under some circumstances, these theories do not address directly the issue of cost-reducing efficiency gains for individual providers (Child and Faulkner 1998; Brandenburger and Nalebuff 1996). Similarly, although co-operation between health service providers may avoid duplication of services (the 'wasteful' competition identified by the Labour Party) and secure some cost reductions through the achievement of economies of scale, there is no direct mechanism for promoting productivity gains. The official change in expected behaviour of agents in the NHS thus leaves the Treasury still requiring a mechanism for achieving productivity increases.

The instrument that has been chosen is one of setting cost performance targets for individual Trusts where the targets are nominally determined by the rank order of Trusts in terms of case-weighted costs (NHSE 1997, NHSE 1998). This system borrows some of the elements of yardstick competition, a regulatory mechanism used in other sectors where local monopolies exist. However, as noted below, the way in

which the performance management system will operate in the NHS weakens the incentive structure that makes yardstick competition attractive in other sectors.

The paper is organised as follows. In Section II we outline the theory of yardstick competition and the preconditions for its implementation as a successful regulatory device. Section III describes and reviews the productivity indices used in the NHS and in Section IV we consider the incentives to improve efficiency embodied by these indices. Conclusions are offered in Section V.

II YARDSTICK COMPETITION

The classic case where competition cannot drive efficiency gains is that of local monopoly. In broad terms there are two ways of dealing with the adverse welfare effects of market power which may arise in this context: find ways of introducing more competition into the market or introduce mechanisms to prevent the monopolist charging monopoly prices. Attempts to introduce greater competition into the market are not considered further here but involve reducing entry barriers, assisting new entries, dismantling monopoly control over assets etc.

Price regulation may take the form of a rule under which prices reflect actual costs to a greater or lesser extent, depending on the precise formulation of the rule. Most rules will fall somewhere between the two extremes of either allowing price to reflect accurately the observed costs or setting a fixed price (or cap) regardless of the actual costs incurred by the firms (Armstrong *et al* 1994). The former has the advantage of avoiding excessive profits but has weak incentives for cost reduction on the part of the firms. At the other end of the spectrum, fixed price caps have strong cost reduction incentive effects (improving productive efficiency) but can allow firms to make excess profits depending on the period of time between reviews and on the quality of information available to regulators. In recent years there has been a major move away

from rate of return regulation, with its poor technical efficiency incentives, and toward price regulation based on some form of yardstick competition.

The theory and practice of yardstick competition was developed to enable regulators of local monopolies to place downward pressure on costs by simulating the incentives of competition. Theory suggests that this approach is particularly relevant where there is asymmetry of information between the managers of the firms in the industry and the regulators regarding the conditions within the industry. The most important considerations are the firm's costs, the exogenous influences on these costs and the level of effort expended by firms. In such circumstances, if regulation can weaken the individual firm's monopoly on information, a better trade-off between productive and allocative efficiency may be achieved.

Under yardstick competition, a maximum unit price (or total revenue) is set for each firm enabling it to generate a rate of return equal to the firm's cost of capital as determined by capital markets (regulators frequently use the capital asset pricing model to arrive at judgements on the cost of capital). This regulated price is based on evidence of achievable costs by *other* firms within the same industry, not just on the individual firm's costs. Making the regulated price partly independent of a firm's own costs is the key to maximising incentives for cost reduction. A major attraction of yardstick competition is that it maintains incentives for the most efficient firms to continue to seek out cost savings. Yardstick competition relies on the incentive it gives a firm to improve its own cost performance relative to other firms in the industry: the profit (surplus) that it is allowed to earn is a direct function of its ability to outperform competitors on cost. The more successful the firm at reducing its own costs, the greater its profit.

One of the key components of yardstick competition is that the regulator reduces the information asymmetry between himself and firms by observing the costs of more than a single firm. Being able to observe costs from a number of firms allows the regulator to infer more about the conditions faced by a particular firm within the same industry and about the level of effort behind this particular firm's cost level. However, in order to make accurate inferences, differences in the operating conditions

facing each firm must be taken account of systematically. If not, differences in observed costs will not be a good signal of effort but may well be related to exogenous factors over which the firms have little control. In the presence of significant exogeneity, there is little point linking the reward for one firm to the performance of others firms as observed costs in each firm would tell the regulator nothing about the conditions faced by other firms. At one extreme, perfect correlation between effort and the costs of the firms in the industry would suggest that one firm's price should depend solely on the others' costs. At the other extreme, no correlation would suggest price for each firm should depend only on their own costs. In most cases, the optimal solution would lie between the two extremes and price would depend in part on own costs and in part on those of other firms in the industry.

In the UK, the water industry and the electricity distribution companies were considered ideal candidates for the use of yardstick competition by industry regulators as they consist of sufficient number of regional firms to allow the regulator to use comparative cost information in order to set prices. Development of the RPI-X system of price control has meant the regulatory bodies for both industries have invested considerable effort in developing techniques for measuring and attempting to explain differences in the costs of firms and adjusting for differences in the operating conditions they face. It is clear that the conditions facing water firms of very different sizes in different parts of the country will not be identical and that these have to be taken into account in order to use yardstick competition effectively. The techniques available to undertake this analysis can roughly be classed into (a) accounting allocation, (b) regression and (c) data envelopment analysis. The water and electricity regulators have pursued all these approaches. The key message from their work is that the answers obtained on relative productivity are sensitive to the techniques used and that there are no technical reasons for using one technique in preference to another (OFFER 1999, Bosworth 1996). In these circumstances the utility regulators have stressed 'credibility' with industry practitioners as an important reason for using one technique rather than another when arriving at their judgements on the extent to which observable cost differences can be attributed to factors beyond management control as opposed to residual 'x-inefficiency'. This approach is pragmatic given the enormous amount of effort that can be wasted in arguing about the appropriate methods of

estimation, the range of variables to include and the subsequent results of any analysis (Vickers and Yarrow 1989).

The approach chosen for the 'New' NHS borrows elements from models of yardstick competition in order to reduce some of the adverse incentives of the purchaser efficiency index and other elements of the financial regime (Propper 1995). A central criticism of the old system was the dependence of the current year's target on the previous year's performance. Securing cost reducing changes in services can be traumatic and time consuming for both management and clinicians. This effort was not rewarded in the old efficiency index as current achievement determined the baseline for next year's target: successful hospitals were penalised by having more stringent targets imposed for subsequent years.

The NHS also appears a good candidate for experimenting with some form of yardstick competition given the relatively large number of comparators available, notwithstanding the Trust mergers that have occurred in the recent past. It is worth noting that in other industries such as water, the Monopolies and Mergers Committee has opposed mergers between companies on the grounds that merger would reduce the information available to the regulator to implement yardstick competition (Cowan 1997).

In order to operate successfully, yardstick competition must satisfy two main conditions. First, the calculation of price or cost targets must be related to the costs of efficient producers. This requires that costs be appropriately measured, taking into account the degree to which variations are due to factors within the control of the management or owners of the firms, rather than due to differences in operating environments. Second, there must be incentives for providers to respond to the regulated prices by improving their efficiency. The remainder of the paper considers whether these conditions are met by current NHS policy.

III PRODUCTIVITY INDICES IN THE NHS

The issue of how to measure productivity (or, more specifically, cost) differences for the purpose of regulation is of particular significance to the NHS. Recent government pronouncements suggest one approach: a national schedule of reference costs, based on allocation of accounting costs by Healthcare Resource Groups (HRGs) (NHSE 1997). The first version of reference costs was published in November 1998 and the data aggregated into a Reference Cost Index (RCI) (NHSE, 1998b). This index was constructed using information provided by each Trust about the costs of their surgical activity, defined by HRGs. The RCI is a weighted summary of this information and is adjusted for the differences in the cost of land, building and labour in the NHS using the Market Forces Factor (MFF).

It has been suggested that the Treasury and Department of Health may treat the existence of large variations in clinical practice as constituting evidence of inefficiency and potential for cost saving (Bevan *et al* 1998). However, variation in clinical practice at the 'micro' level does not necessarily reveal itself at the 'macro' level of Trust-wide productivity measures. When publishing the first version of the Reference Cost Index, the DH pointed out that 90% of Trusts were within +/- 20% of the average even though costs for individual HRGs often appeared to vary by more than 100% (NHSE, 1998b p.18). Most obviously, aggregation to hospital level irons out discrepancies among hospitals in their cost allocation procedures to specialties and HRGs.

The RCI initially generated publicity in the national press but little comment in health service publications, perhaps implying that it was not viewed as credible within the NHS. The fact that, even though it purported to adjust for case-mix, the two Trusts providing the most and least complicated procedures were respectively least and most 'efficient', suggests that factors explaining cost differences were not adequately dealt with.

Criticism focused on three major deficiencies. First, the RCI related to surgical activity and failed to account for outpatient, accident and emergency, and non-acute activity. Second, it used Finished Consultant Episodes (FCEs) to measure activity, a measure with known deficiencies. Third, although there was an attempt at *post hoc* clustering by family group, the index itself failed to take into account factors known to influence costs such as hospital size, split site working, teaching status and severity of cases treated.

By March 1999, the Department of Health had produced five *different* cost indices attempting to describe the relationship between hospital costs and activity. Each new index made allowance for one or more of the problems noted above.

The problem of limited coverage was partially addressed by construction of a new cost index referred to as the RCI+. It used available, but incomplete, data on activity not covered by the RCI in an attempt to estimate relative cost performance over the entire range of an acute hospital's activity. Unlike the other four indices, few details have emerged about how the RCI+ was constructed. Nevertheless, the Department of Health recommended that the RCI+ provide the starting point in regions for discussions leading to the setting of the 1999/2000 efficiency targets for individual Trusts.

More systematic attempts to deal with the problems of the original RCI appear in the three most recent cost indices produced by the Department of Health and the Audit Commission (Casemix Cost Index - CCI; Casemix Costliness Index - 2CCI; Casemix Costliness and Configuration Index - 3CCI). All three of the new indices use patient 'spells' rather than FCEs as a measure of hospital activity. Furthermore, they are based on data from the Hospital Episode Statistics rather than the non-routine returns used for the RCI. The three new indices were derived by regressing casemix adjusted costs against a succession of explanatory factors, with the 3CCI including the most comprehensive set of adjustments. The basic structure of each index is given in Annex 1.

It is not surprising that a Trust appearing 'inefficient' on one index can emerge as relatively 'efficient' on another. To some extent a change in rankings is to be expected, as Trust positions reflect the differential impact of the various explanatory factors that each index takes into account. What is surprising is the extent of movement. Only ten Trusts remain in the same decile across all indices. In contrast to this stability, Trusts move an average of 80 places from one index to the next – equivalent to a third of the league table. Table 1 shows the twenty Trusts displaying greatest movement across four indices (data on RCI+ were unobtainable), together with the original rank position on the RCI and the movement from one index to the next. At the extreme, the Queen Victoria Hospital Trust moves from near the bottom of the RCI (206/213) to third most 'efficient' on the 3CCI. This is a bit like Bishop Auckland going from near the bottom of the Unibond League to championship contenders in the Premiership because points won have been adjusted for things such as the team's disciplinary record, the players' wage levels, and the ground's capacity and facilities. Arsenal would slip rapidly in the opposite direction.

What are the implications of this apparent variability? First, it is important to be clear about which index is most appropriate. There are good economic reasons for believing that 3CCI should be a much better rough indicator of short-term relative performance than the other indices because it attempts to account for the greatest range of influences on observed costs. Management has little control over size, mergers reflect national policy, and diseconomies of scale should not be confused with X-inefficiency. Adjustment of the capital stock associated with multi-site working takes time and depends on regional capital priorities. Nevertheless, even the 3CCI requires improvement in terms of its econometric specification and the explanatory variables used.

Second, it is important that each index reports not only each Trust's relative position, but also provides an indication of the confidence that might be placed on this position being an accurate reflection of relative efficiency. It is well known from that crude rankings can lead to erroneous conclusions about relative performance (Goldstein and Spiegelhalter 1996). Techniques are available to derive confidence intervals for institutional performance and these should be pursued where possible (Marshall and

Spiegelhalter 1998).¹ It may be that there is considerable movement across indices because the performance of different Trusts does not actually vary greatly but is generally random. Differences in efficiency may not be great enough to merit the level of attention they are currently accorded.

A frequent criticism of the 'old' NHS was the extent to which management effort was diverted to meeting the 'efficiency index' targets at the expense of less quantifiable service improvements. One of the advantages of having available better information on hospital costs is that it may be possible to put the issues in perspective. We know from standard economic theory that where input productivity varies (more skilled managers or clinicians, older capital stock) and factor prices do not reflect productivity differences, we will observe inter-firm differences in costs. Studies of manufacturing industry stress the difference in costs between firms when some firms in the industry maintain a capacity for R&D and product innovation while other firms are simply 'assembly' plants (Lucia 1996). We would expect the same in health care: our ability to separate these sources of cost differences from x-inefficiency remains rudimentary.

IV INCENTIVES TO IMPROVE EFFICIENCY

The essence of yardstick competition as used in other industries is that the surpluses enjoyed by producers depend on their cost performance relative to that of other firms. Thus if they outperform their peers they benefit directly by retaining the generated surplus. The only disincentive comes in the longer term if all firms consistently lower their costs as this will result in lower allowed prices across the board. In theory, this can encourage collusion among firms, although in practice this is likely only if there are few firms that are well informed about each other's behaviour.

¹ This is currently being investigated by one of the authors and a future paper will present initial results

The current government's approach to generating efficiency gains in the NHS is still evolving. As mentioned earlier, one new element is that a Trust's unit cost reduction target will no longer be based solely on its own previous year's performance but also on how well it performs relative to other Trusts. A second new element of policy is that a Trust securing cost reductions over (presumably) a three-year financial Health Service Agreement with Health Authorities or Primary Care Groups will be allowed to retain part of the surplus. However, the cost targets set by the NHS Executive are not integrated into local commissioning arrangements. There is no obvious connection between meeting the centre's cost targets and the generation of a surplus on the financial agreements with commissioners. Consequently, the present NHS system lacks the incentives of yardstick competition to outperform cost targets.

By separating the incentive to meet central cost targets from the prospect of the reward of a larger surplus from commissioning bodies, the new NHS system introduces some interesting trade-offs. The least arduous means (for a Trust) of meeting the centre's cost reduction target may well remain that of increasing measured throughput, just as with the old efficiency index. However, if the prospect of acquiring an explicit financial surplus is attractive to the Trust, then a situation could arise where the pattern of activity favoured by (and rewarded by) commissioners would involve failure to meet central cost targets. This would not be a trade-off for Trusts in a regime based on yardstick competition but is relevant when cost performance targets are set independently of revenues.

It may not be difficult to integrate the two parts of the new regulatory regime and produce a system with the clearer incentives required for yardstick competition. If cost reduction targets were embodied in the financial agreement with purchasers then the incentive to improve upon targets would be restored. Improvement over and above that set out in the agreement would accrue as part of the Trust's surplus—the reward for effort.

This option would not be far removed from that adopted in Victoria, Australia. The Victorian government moved from financing hospitals using Health Service Agreements, which specified broad activity targets and associated revenues, to a

casemix funding system, under which hospitals are reimbursed for actual activity on the basis of prospectively determined payment rates (Duckett 1995). The rates are revised at the start of each budgetary period to ensure that efficient hospitals have an incentive to stay ahead of their peers. These payment rates can be considered equivalent to the regulated prices observed in situations of yardstick competition.

The Victorian government was faced with the dilemma of having to cap global expenditure while providing incentives to respond appropriately to demand for services. The solution was to set aside a portion of the government's global budget and operate this portion as a pool of funds to which hospitals would be allowed access if they provided services in addition to their baseline targets. A further condition of access was that additional activity had to be directed, first and foremost, to patients on waiting lists. Access to additional funding was attractive to hospitals, particularly as it provided extra revenue to offset the effects of budget cuts which had been imposed simultaneously with the casemix funding policy. The price per patient funded from the pool was allowed to fluctuate according to total additional activity within the hospital sector. This meant that hospitals did not know in advance precisely what price they would receive for their marginal output although, at least during the pool's initial operation, the government provided minimum (and maximum) guarantees. Within this band, hospitals had to base their expectation on their knowledge of other hospitals and the size of the pool. The policy effectively combined price regulation with incentives to improve the efficiency of hospital provision.

This is analogous to the way in which some Health Authorities and Trusts included reference to achieving efficiency targets within their annual contracts in the past. Health Authorities agreed the relative contribution to their efficiency target with local Trusts and sometimes then incorporated this into the contract, normally as a directive to the Trust. However, this falls short of the Victorian system which provides incentives for Trusts to meet such targets, rather than just stating they should be met as part of the contractual agreement (and indeed, they often were *not* met by individual Trusts).

V CONCLUSIONS

The new NHS aims to use alternative methods to competition in order to produce the efficiency gains which were meant to materialise from the former internal market. This is probably a wise course of action in the light of continued Trust mergers, that will enhance the position of providers along, and the fragmentation of purchasing as PCGs develop. The use of comparative measures of performance as a means of monitoring several agents has a strong theoretical attraction (Nalebuff and Stiglitz 1983; Holstrom 1982). Yardstick competition as one variation of this general approach has appeal within the NHS given the structure of local monopolies and the large number of comparators available. It also has an advantage of avoiding some of the disincentive effects associated with previous instruments such as the efficiency index.

Critical to the use of yardstick competition is the ability to measure the relative efficiency of firms and, as we have indicated above, this may be difficult to do well within the NHS. However, successive attempts by the Department at producing better and more acceptable methods of measuring costs suggests that this is not an impossible task and one which may become less onerous over time once participants become accustomed to providing and using the data. There are also lessons from the experience of other industries of experimenting with different approaches to producing efficiency measures as well as methods of ensuring the results are viewed credibly by the participants. If the Department chooses to take this comparative approach seriously, it will also need to consider the impact of successive waves of Trust mergers on the utility of the cost information obtained from a smaller number of Trusts. At the extreme, with a single Trust for each HA area, the unit cost data may simply become a reflection of the resource allocation formula and reveal nothing about the efficiency of the hospital compared with others (Ashford et al 1991). If so, this undermines attempts to specify hospital cost functions.

We have argued that there are more fundamental problems with the methods proposed for the NHS that will exist even if the process of generating and using cost data

improves in future. First, we have argued that in order to make judgements about the significance of observed cost differences we require confidence intervals around the means reported in the league tables. It may be that variations in hospital wide costs are not large enough to merit substantial effort on the part of regulators and hospital management, particularly if this comes at the expense of consideration of other areas of performance.

Second, we have argued that there is an important missing link in the system currently proposed for the NHS which weakens the incentive effects of yardstick competition in this context. The lack of a direct relationship between the achievement of cost targets and the retention of surpluses suggests that Trusts will not be strongly motivated to meet such targets (and indeed may actually pursue other strategies which will prevent them meeting the targets if this allows them to make surpluses). It is not yet clear what mechanisms will be used at regional and national levels to deal with those Trusts that do not achieve the targets. What is clear is additional mechanisms will be required as the incentives embodied in the system are currently inadequate.

As a way forward, we suggest that research should focus on a number of areas:

- the creation of confidence intervals around the currently available cost estimates. This would allow us to explore the degree to which variations may be attributed to differential performance rather than to the inevitable ‘noise’ associated with such processes;
- linked to above, further exploration of the importance of cost variation in the NHS versus other health care systems in other countries or in other sectors where cost regulation is used;
- investigation of the potential for ‘real’ yardstick competition to be used in the NHS through the linking of rewards to the achievement of cost targets.

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ANNEX 1: DEPARTMENT OF HEALTH COST INDICES

1. **RCI:** The National Reference Cost Index was compiled using data provided by Trusts about their unit costs by Healthcare Resource Group (HRG) for their main surgical specialties. The RCI was a weighted average of all HRG costs in each Trust relative to the national average. The index was published in November 1998
2. **RCI+:** The RCI covered only acute activity. The RCI+ attempts to provide a comprehensive indication of activity, by including non-surgical, outpatient and accident and emergency activity.
3. **CCI.** The Casemix Cost Index (CCI), unlike RCI, includes mental health services and day care costs. Activity in the CCI is summarised as a weighted combination of HRG based inpatient spells, outpatient first attendances and A&E first attendances.
4. **2CCI.** The Casemix Costliness Cost Index (2CCI) builds on the CCI, incorporating adjustment for other variables hypothesised to explain cost differences among trusts. Many of these adjustments attempt to account for the possibility that, even within an HRG, some hospitals will treat more costly patients. Hospital transfers, multi-episode spells, and the proportion of elderly or female patients are included to account for cost differences over and above the HRG casemix adjustment. In addition, the 2CCI makes allowance for possible cross-subsidisation between patient care and teaching or research which is not adequately dealt with in the SIFTR allocations, and for differences in local labour costs, assessed using the Market Forces Factor. The extent of the adjustment for each of these variables is estimated through regression analysis.
5. **3CCI.** The 2CCI has been described as a long-run cost index in that it implies that hospital infrastructures are similarly configured. In reality, hospitals may appear relatively inefficient on the 2CCI because of factors beyond immediate managerial control. The 3CCI – the Casemix Costliness and Configuration Index – attempts to take some of these factors into account, over and above the adjustments made in the 2CCI. These include the costs of multi-site working, measured by the number of sites with more than 50 beds, hospital size, measured by the number of beds, and capacity utilisation, reflected by the number of patients treated.

TABLE 1: TRUSTS DISPLAYING GREATEST MOVEMENT ACROSS INDICES

code	trust name	max move	rci mff	adjusted rank	rci v cci	rci v cci2	rci v cci3	cci v 2cci	cci v 3cci	2cci v 3cci
RPC	THE QUEEN VICTORIA HOSPITAL NHS	203	206		32	178	203	146	171	25
RJN	EAST CHESHIRE NHS TRUST	198	11		-185	-182	-198	3	-13	-16
RJ5	ST MARYS HOSPITAL NHS TRUST	192	186		-16	110	176	126	192	66
RP6	MOORFIELDS EYE HOSPITAL NHS TRUS	184	1		-184	-20	-28	164	156	-8
RJ7	ST GEORGES HEALTHCARE NHS TRUST	183	110		-100	-102	81	-2	181	183
RPX	ROYAL BROMPTON HOSPITAL NHS TRUS	181	146		-52	-64	117	-12	169	181
RCC	SCARBOROUGH & NE YORKSHIRE HEALT	180	192		180	168	28	-12	-152	181
RCU	SHEFFIELD CHILDRENS HOSPITAL NHS	180	186		126	178	180	52	54	-140
RNJ	THE ROYAL HOSPITALS NHS TRUST	180	96		-104	11	76	115	180	2
RGW	KENT & CANTERBURY HOSPITALS NHS	175	2		-147	-175	-169	-28	-22	65
RC1	BEDFORD HOSPITALS NHS TRUST	172	186		109	148	172	39	63	6
RM2	SOUTH MANCHESTER UNIVERSITY HOSP	172	16		-161	-166	-172	-5	-11	24
RPR	THE ROYAL WEST SUSSEX NHS TRUST	171	196		136	103	171	-33	35	-6
RN1	WINCHESTER & EASTLEIGH HEALTHCAR	164	39		-153	-164	-154	-11	-1	68
RAX	KINGSTON HOSPITAL NHS TRUST	162	80		-114	-122	40	-8	154	10
RQN	THE HAMMERSMITH HOSPITALS NHS TR	161	47		-157	-161	-157	-4	0	162
REY	WRIGHTINGTON HOSPITAL NHS TRUST	159	204		127	159	64	32	-63	4
RJZ	KINGS HEALTHCARE NHS TRUST	159	172		-27	40	132	67	159	-95
RCB	YORK HEALTH SERVICES NHS TRUST	158	39		-110	-123	-158	-13	-48	92
RBV	CHRISTIE HOSPITAL NHS TRUST	157	158		157	156	156	-1	-1	-35
										0