

The Restructuring of the Teachers' Salary Scale and the Implications for Pensions in Jamaica

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1. Introduction

This study, commissioned by the Ministry of Education, Youth, and Culture of the Government of Jamaica, investigates the way in which primary and secondary school teachers in Jamaica are paid. The specific objectives of the study, as set out in the Terms of Reference, are to:

1. evaluate the present structure of the teachers' salary scale;
2. identify alternative strategies for restructuring the scale to improve incentives; and
3. assess the implications for pensions and the challenges for implementation.

The following Section 2 gives an overview of the education sector in Jamaica, with particular focus on aggregate expenditures, student achievement, and the teaching profession. Section 3 addresses the question of how a provider of education services (in this case, the government) should pay teachers, in terms of factors that influence both the level of compensation and its structure. Section 4 provides a detailed analysis of the pay scales used to pay teachers, and Section 5 investigates ways they might be rationalized or otherwise altered.

Section 6 of the report turns to the question of pensions, and describes a methodology for estimating the effects of changes in wage structure on pension liabilities. Some indicative simulations are presented. Finally, Section 7 presents a summary of the report's main recommendations and conclusions.

It is incumbent on the author to state that definitive policy recommendations are subject to wide margins of error in this kind of analysis. Empirically establishing a link between the *level* of teacher pay and student performance is hard enough. But positively identifying a link between the *structure* of teacher pay and student performance is much more difficult. The analysis must then rely on informed consideration of issues of incentives, labour supply, and teacher productivity, drawing on lessons from a wide range of subdisciplines within the education and general economics literature.

2. Context

Public Expenditures on Education

The government of Jamaica has spent about 6-7 percent of GDP on education in each of the last 4 years, representing around 10-11 percent of total government spending. Recurrent public expenditure on primary and secondary schooling ran at slightly over 4% of GDP (see Table 1). In addition to this, estimates of private education spending, in the form of user fees at some public schools, text book purchases, and tuition fees at a limited number of independent

schools, suggest that total education spending over this period was approaching perhaps 10 per cent of GDP.

| Table 1: Recurrent Primary and Secondary Education Expenditure in Jamaica, 1999-2002 | | | |
|---|------------------|----------------|----------------|
| J\$ million | 1999-2000 | 2000-01 | 2001-02 |
| Primary education (grades 1-6) | 4,597 | 5,518 | 6,000 |
| Secondary education (grades 7-11) | 6,628 | 7,231 | 8,125 |
| Total | 11,225 | 12,749 | 14,124 |
| Total as percent of GDP | 4.09 | 4.15 | 4.22 |
| <i>Source: Education expenditure from MOEYC (D. Hamilton), GDP data from PIOJ website.</i> | | | |

These expenditure levels are high in Jamaica by developing country standards, as are enrolment rates (Table 2).²

| Table 2: Enrolment Rates by Age Group, 1998-99 (Percent) | | | | | |
|---|------------------|----------------|-----------------|-----------------|-----------------|
| | Age Group | | | | |
| | 3-5yrs | 6-11yrs | 12-14yrs | 15-16yrs | 17-19yrs |
| Pre-primary | 80.5 | ... | ... | ... | ... |
| Primary | 1.4 | 92.5 | 8.8 | ... | ... |
| Secondary | ... | 3.1 | 83.4 | 70.0 | 13.0 |
| Total | 81.9 | 95.6 | 92.2 | 70.0 | 13.0 |
| <i>Source: Jamaica Education Statistics, 1998-99, p. 63.</i> | | | | | |

Student Performance

However, the extent to which the school system augments the stock of human capital is questionable. While precise estimates of the effects of education on future labour productivity and earnings are difficult to come by, evidence suggests that completing secondary school does

² See also Figures 1-4 and 12 in World Bank (1999): "Jamaica: Secondary Education: Improving Quality and Extending Access," Report No. 19069-JM. That analysis shows that Jamaica's predicted education expenditure, given the level of GDP, would be about half its actual spending.

not improve an individual's labour market prospects significantly, if at all (World Bank, 1999)³. Similarly, student test performance appears weak. In the 1998-99 Grade Six Achievement Test (GSAT) mean scores in all four major subject areas were less than 50 percent, particularly amongst primary, primary and junior high, and all age schools (Table 3).

| Table 3: Grade Six Achievement Test, Mean Scores by Subject and School Type, 1998-99 | | | | |
|---|--------------------|----------------|-----------------------|----------------------|
| | Subject | | | |
| | Mathematics | Science | Social Studies | Language Arts |
| Primary | 41 | 43 | 48 | 48 |
| Primary and junior high | 40 | 42 | 46 | 47 |
| All age | 39 | 40 | 45 | 44 |
| Preparatory | 70 | 68 | 75 | 61 |
| Total | 42 | 44 | 48 | 48 |

Source: Jamaica Education Statistics, 1998-99, Tables 4-1(i) and 4-1(ii).

Over the last three years, student performance on the GSAT has shown some improvement, as illustrated in Table 4. The mean scores in the four subject areas reported have increased from their 1998-99 levels, although there is arguably still room for continued progress.

| Table 4: Grade Six Achievement Test, Mean Scores by Subject, 1998-99 – 2000-01 | | | |
|---|------------------|------------------|------------------|
| Subject | 1998-1999 | 1999-2000 | 2000-2001 |
| Math | 42 | 49 | 52 |
| Science | 44 | 54 | 55 |
| Social Studies | 48 | 55 | 57 |
| Language Arts | 48 | 58 | 57 |

In 1998-99, of those students sitting for the Jamaica School Certificate, only 20.1 percent passed the English test, 26.9 percent passed the mathematics test, and 19.5 percent passed the Principles of Accounts test. Performance in other subject areas, including general science and biology, was more promising (see Table 4).

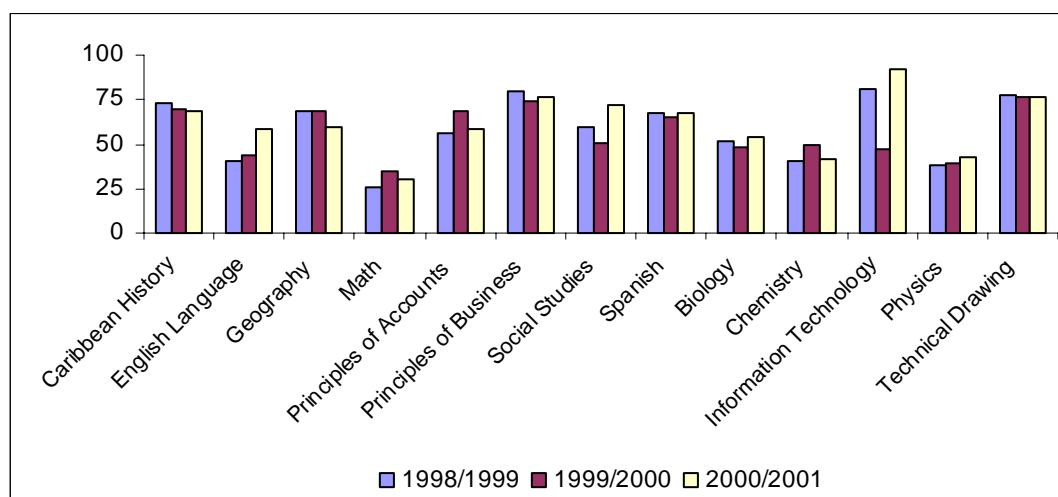
³ World Bank (1999): "Jamaica: Secondary Education: Improving Quality and Extending Access," Report No. 19069-JM.

Table 5: Student performance on Jamaica School Certificate, 1998-99

| Subject | Percent Passing | Subject | Percent Passing |
|----------------------|-----------------|------------------------|-----------------|
| English language | 30.1 | Agriculture | 22.8 |
| Mathematics | 26.9 | Commercial practice | 51.3 |
| Civics | 65.1 | History | 15.6 |
| Agricultural science | 12.1 | Principles of accounts | 19.5 |
| Biology | 77.2 | Typewriting | 85.2 |
| General science A | 51.9 | | |

Source: Jamaica Education Statistics, 1998-99, Table 4-5.

Finally, student performance in key subjects in the Caribbean Examinations Council (CXC) has been disappointing. Students are graded on each subject on a scale of 1 (the highest) through 5, and the Ministry of Education, Youth, and Culture considers grades 1, 2, and 3 to constitute a pass. While pass rates in 1998-99 were over 70 percent in 20 of the 35 subjects, only 27 percent of students passed the mathematics exam and 41 percent passed English language. More than half the students received the lowest grade of 5 (or no grade) for mathematics.⁴ While performance in some subjects has improved over the last three years, particularly in English language, progress is by no means broad-based, as illustrated in Figure 1.

Figure 1: Caribbean Examinations Council (CXC): Percent Candidates Attaining Grades 1,2, & 3 at the General Proficiency Level in Selected Subjects

⁴ Source: Jamaica Education Statistics, 1998-99: Table 4-7.

The question of how to reallocate existing public resources to improve educational attainments presents a substantial challenge, both technically and politically. A myriad of econometric studies of the determinants of educational attainments in developing countries, recently reviewed by Glewwe (2002),⁵ examine the potential impact of teacher education and pay, class size, physical facilities, and teaching materials. The results of these studies in a variety of different countries tend to be difficult to generalize, primarily because of wide variation in country-specific characteristics, as well as methodological problems associated with the nonrandom nature of variation used to identify policy effects. One study of Jamaican primary education⁶ found that student performance responded most significantly to regular use of text books. Having all teachers trained improved performance, but relatively weakly. However, another study by the Ministry of Education, Youth, and Culture⁷ found that teacher training was, if anything, negatively correlated with student performance, and that teacher experience also lowered test results (although the effect was statistically insignificant). In addition to these supply side factors, household level characteristics — including parents' education, income, etc. — as well as the broader labour market environment prove influential in determining student attendance and performance.

Teaching Personnel

The number of teachers employed in Jamaican schools — about 22,758 in 2000-01 — appears to be sufficient, as measured by pupil-teacher ratios.⁸ Indeed, Table 6 reveals relatively generous average pupil-teacher ratios by school type, with class sizes generally falling as children progress through the system from primary (31 students per teacher in 1998-99, up to 34 in 2000-01) to secondary high schools (18 students per teacher in 1998-99, and 19 in 2000-01). Across the island, the variation of average class size by Parish in 2000-01 was not insignificant, as illustrated in Figure 2.

⁵ Glewwe, Paul (2002), "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes," *Journal of Economic Literature*, XL: 436-82.

⁶ Glewwe, Paul, Margaret Grosh, Hanan Jacoby, and Marlaine Lockheed (1995), "An Eclectic Approach to Estimating the Determinants of Achievement in Jamaican Primary Education," *World Bank Economic Review*, 9(2): 231-58.

⁷ "School Factors Which Affect Performance at the Secondary Level," Policy Analysis and Research Unit, Planning and Development Division, June 1996.

⁸ The number of teachers fell to 21,666 in 2001-02, partly due to some being attracted to positions in the U.S. and UK.

| Type of school | Primary | All-age | P&JH | Comprehensive | Secondary High |
|----------------|---------|---------|------|---------------|----------------|
| 1998-99 | 31 | 26 | 27 | 18 | 18 |
| 2000-01 | 34 | 28 | 28 | | 19 |

Source: Jamaica Education Statistics, 1998-99, Tables 2-1, 3-6, 3-10, 3-14, 3-16, 3-18. 2000-01 data supplied by Ministry of Education.

Figure 2: Pupil-Teacher Ratios by Parish, 2000-01⁹

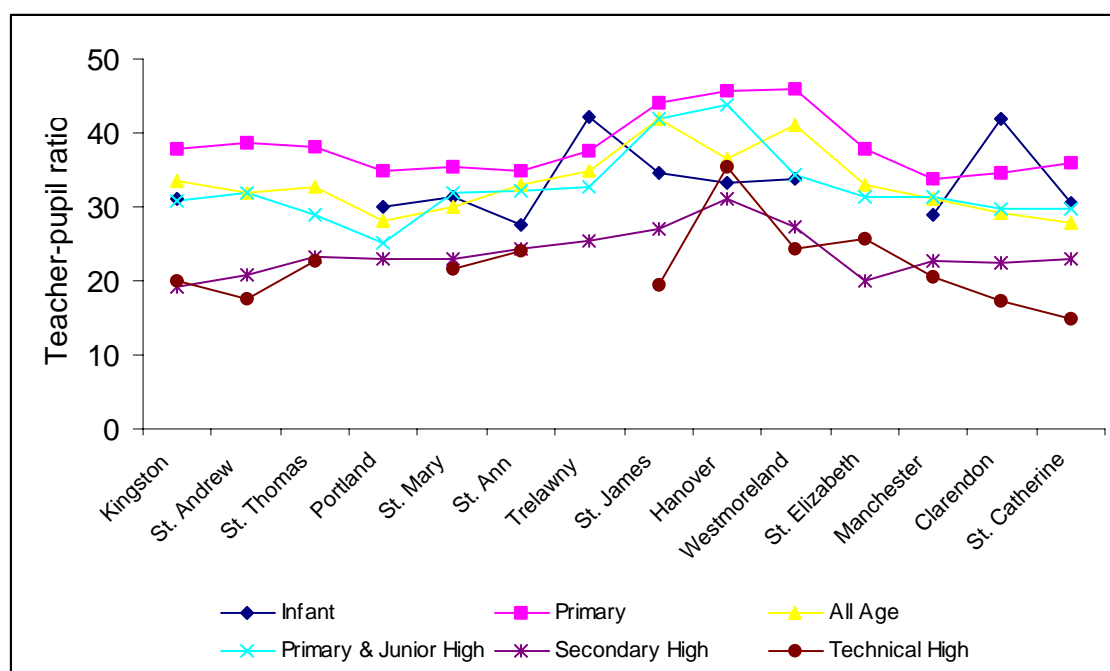


Table 7 presents data on the distribution of pupil-teacher ratios at the primary school level, across schools. Recall from Table 6 that the countrywide average pupil-teacher ratio at this level was about 31 in 1998-99. Nonetheless, in that year nearly half the primary schools had average class sizes of 36 or above. This suggests that larger primary schools had more favorable pupil-teacher ratios than smaller primary schools, so that while there may be limited geographic varia-

⁹ Source: Ministry of Education.

tion on average in the ratio of pupils to teachers, the variation across schools could be important.¹⁰

Between 1998-99 and 2000-01, the average pupil-teacher ratio in primary schools increased, while over the same period the proportion of schools with ratios at or below 35 increased. This suggests that there was a reallocation of teachers (or students) that tended to make pupil-teacher ratios more equal, while the average nonetheless increased.

| Table 7: Pupil-Teacher Ratio at the Primary Level | | | | |
|--|---------------------|--------------|---------------------|--------------|
| 1998-99 | | | 2000-01 | |
| Pupil-Teacher Ratio | % of Schools | Cum % | % of Schools | Cum % |
| 20 or less | 10.4 | 10.4 | 10.2 | 10.2 |
| 21-35 | 41.7 | 52.1 | 47.8 | 58.0 |
| 36-50 | 40.2 | 92.3 | 38.6 | 96.6 |
| 50 and over | 7.6 | 100.0 | 3.4 | 100.0 |

Source: Jamaica Education Statistics, 1998-99, p. 20; 2000-01 data supplied by Ministry of Education.

Although average class sizes seem adequate to good, it is likely that many classes are still over-crowded, due to the limited number and size of actual classrooms, and inadequate provision of desks and chairs. Site visits by the consultant suggested anecdotal evidence that such space constraints were indeed binding, however the lack of representative quantitative information about crowding is surpassed only by the lack of empirical evidence on the relative merits of relaxing the constraint by investing further in school construction compared with increasing the supply of other factors, such as teaching materials.

Measuring the quality of the teaching profession is as important as its size. Table 8 reports the breakdown of teachers by qualification in both 1998-99 and 2001-02, and the latter data are illustrated in Figure 3.

¹⁰ One participant in discussion of this report noted that differences between rural and urban schools could be important. The average pupil-teacher ratios in secondary schools were similar in the two types of region, being 20:1 in rural areas and 19:1 in urban areas. However, primary school ratios differed more, favoring rural areas, where the ratio was 29:1, compared with 34:1 in urban areas. These data are for 2000-01.

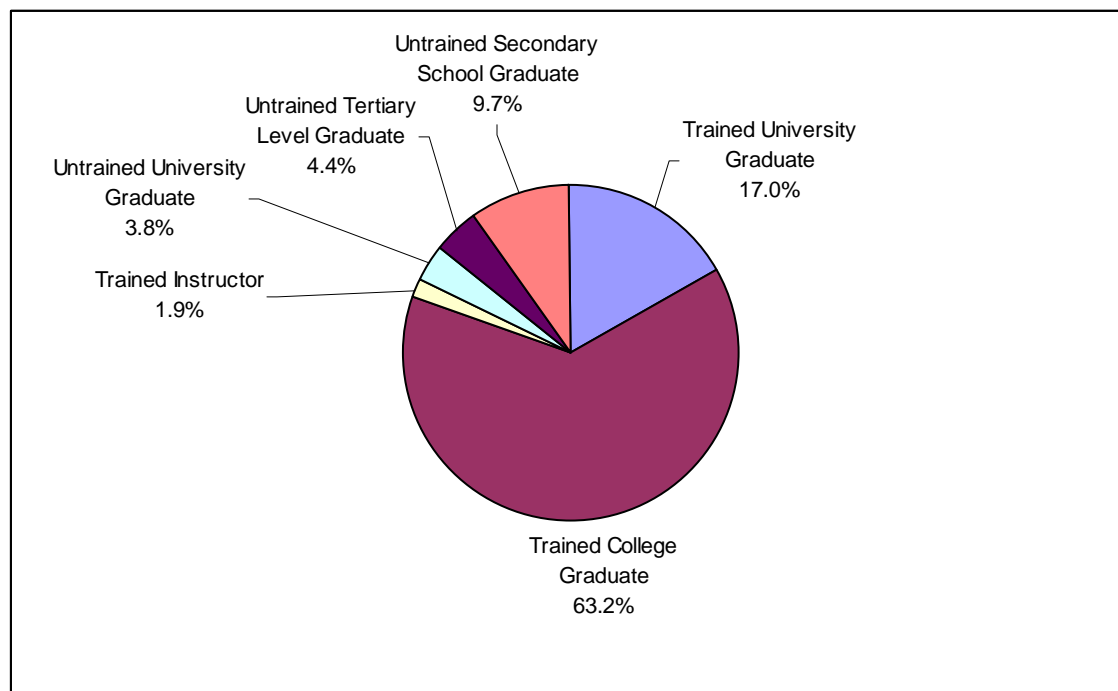
| Table 8: Qualifications of Teachers in Infant, Primary, and Secondary Schools, 1998-99 and 2001-02 | | | | | | |
|--|------------------------------------|--------------------------------------|---------------------------------|--|---------------------------|--|
| | Trained University Graduate | Untrained University Graduate | Trained College Graduate | Untrained Tertiary Level Graduate | Trained Instructor | Untrained Secondary School Graduate |
| 1998-99 | 12.5 | 3.8 | 63.6 | 4.1 | 2.5 | 13.5 |
| 2000-01 | 17.0 | 3.8 | 63.2 | 4.4 | 1.9 | 9.7 |
| <i>Source:</i> Jamaica Education Statistics, 1998-99, Table 2-3; 2000-01 data supplied by Ministry of Education. | | | | | | |

About 80-85 % of employed teachers have attained some level of teacher training, either at the diploma or certificate level. On the other hand, only about 20 percent had a university degree in 2000-01, and about 10 percent had only a secondary school education. Table 8 indicates that these statistics have, however, improved in the last few years: in 1998-99 only 16% of teachers were university graduates, and 13.5% had only a high school diploma.

The evidence suggests that the compensation offered by the government – including salary, pensions, vacations, and other benefits – is sufficient to attract enough individuals into the teaching profession. On the other hand, as student performance seems weak at best, there may be scope for improving the productivity of teachers. This can be done either by inducing individuals who would be *better* teachers to enter the profession, or by providing *existing* teachers with better incentives to perform.

As long as teaching ability is correlated with more extensive and better remunerated labour-market opportunities, improving the inherent quality of the teaching profession requires paying higher salaries, thereby increasing the wage bill borne by the government. On the other hand, improving incentives for existing teachers might be possible by changing the way in which they are paid. The next section discusses these issues in more detail.

Figure 3: Qualifications of Teachers in Infant, Primary, and Secondary Schools, 2001-02¹¹



3. How to Pay Teachers¹²

Objectives of an education system

The objectives of most education systems are to provide education — of a certain duration and of a certain quality — to eligible children at reasonable cost to the budget. By “reasonable” we might have in mind a trade-off between the quality of education and its cost, and that the social value of increasing quality beyond some point is not worth the extra cost incurred. Instead of introducing this trade-off, let us assume that the government has a certain level of education in mind, perhaps defined by some output goals (e.g., literacy improvements, reductions in dropout rates, etc.). In a world of budget constraints (and the constraint is very real for the public sector in Jamaica) the government’s object must then be simply to provide the defined level of education at minimum cost. Education policy should focus on children: the well-being of teachers —

¹¹ Source: Ministry of Education.

¹² A useful source for issues of incentive pay, promotions, and internal labour markets is Paul Milgrom and John Roberts (1992): *Economics, Organization, and Management* (Englewood Cliffs, New Jersey: Prentice Hall).

in particular, their income levels and social status — should only enter into *education policy* decisions to the extent that better paid teachers are known to do a better job than when they are poorly paid.¹³

Minimizing Costs

In any production process, part of minimizing costs is choosing the right mix of inputs — in the education sector this means getting the mix between teachers and administrators right, choosing the right capital-labour ratio, getting teacher-pupil ratios on target, and choosing the right size schools (if average costs are U-shaped). Although such optimal input mixes are functions of input prices, let us assume they are fixed for now (as would be the case if there is little substitutability amongst factors).

Minimizing costs then just means paying enough, but only enough, to induce the required supply of each input. In many input markets (e.g., for material inputs), prices are competitively determined and, as far as an individual purchaser is concerned, are fixed. In these cases, the purchaser has no substantive choice over how much to pay: given the fixed ratios required, and the fixed output goal, the number of inputs is predetermined. Since the price is also determined by the market, the purchaser cannot influence the total amount spent.

The Supply of Teachers

In Jamaica, and in many other countries, the government is the primary purchaser of teachers' services. This means that in practice it cannot buy as many teachers as it wants at a given market wage. In general the supply of teachers will be an upward sloping function of the wage offered, and the wage the government must pay in order to reach its target output of education is that which induces a sufficient number of individuals to enter the teaching profession to meet this goal.

The relationship between the supply of teachers and their wage rate depends on what other opportunities exist for would-be teachers. If the insurance industry is booming (as it was a few years ago in Jamaica) and educated individuals are in high demand in that sector, the supply of teachers at a given wage will be lower than if the insurance industry were in a slump (like now). The wage the government would need to pay to attract enough teachers to the profession would be higher in the first scenario than in the second.

This observation suggests that teachers might be paid what they could get in the private sector. It is worthwhile noting, however, that the correct implication to draw is that the wage offered to teachers needs to be set equal to the private sector compensation of the *marginal* teacher

¹³ Of course, the well-being of teachers, as of all Jamaicans independent of their line of work, should be a concern of social and tax policy. Poor teachers should be targeted just like poor farmers and poor sales clerks for income tax relief or social benefits. Better off teachers should be expected to pay more tax, just like better off accountants and politicians.

— that is, the most expensive of the required teachers to entice out of the private sector. Notice also that this argument suggests teachers should be paid according to their value in alternative employment — e.g., according to their marginal product in the private sector (if the private sector labour market is competitive) — and *not* according to their value in the teaching profession. In this story, paying teachers according to what they produce — e.g., adopting performance based pay — is not advisable.¹⁴

When comparing compensation in the teaching profession and alternative employment, it is of course necessary to adjust money salaries for other attributes of the occupations. The most obvious attribute that distinguishes teaching from many other occupations is average weekly hours and vacation time. Schools typically start for students around 8 am and finish for the day soon after 2 pm. Preparation time is clearly an important additional demand on teachers' time (particularly early on in their careers). Although daily hours, including such preparation time, may not be significantly less than those in other occupations, teaching provides a degree of flexibility that is absent in many other jobs, since teachers can prepare lessons when and where they wish outside of class-contact hours. More importantly, teachers can take advantage of long summer breaks that generally are not available to other workers.¹⁵

Providing Incentives through the Structure of Pay

Changing the way teachers are paid can provide incentives for greater responsiveness to student needs (e.g., through on-the-job effort), continued updating of skills, and the acquisition of further formal training. In this subsection we identify three kinds of pay structure: performance-based pay, outcome-base pay, and qualification-based pay.

Performance-Based Pay

Paying a teacher a salary assumes the teacher will work once appointed. In many professions this is exactly what is done. On the other hand, we might want to explicitly pay the teacher for the services she provides, instead of giving her an annual salary. It is conceivable that she would be paid to prepare her classes, to show up on time, and to engage in certain administrative functions. All of these are “inputs” and it is possible to imagine paying a teacher for these, instead of just for her time. This is one kind of performance-based pay — but it is not output-based

¹⁴ Elementary economics tells us that competitive profit-maximizing firms will pay workers (and other inputs) their marginal products, which sounds in conflict with the statement above. However, this result is an equilibrium condition wherein firms take the wage rate as given and choose the number of workers to employ. Here, the number of workers is determined by the government's objectives regarding the level of education supplied, and its objective is simply to buy those teachers at minimum cost. Another way of seeing this is to note that a government wishing to build a dam at minimum cost would not pay concrete suppliers the value of the dam, but would pay them just enough to get them to deliver the concrete.

¹⁵ See Xiaoyan Liang (2000) for a comparison of teacher pay in twelve countries in Latin America, in which the issue of the benefits associated with a teaching career are addressed. Liang, Xiaoyan (2000): “Teacher Pay in 12 Latin American Countries: How Does Teacher Pay Compare to Other Professions, What Determines Teacher Pay, and Who Are the Teachers?” HD Department, LCSHD Paper Series No. 49, Latin America and the Caribbean Regional Office, World Bank.

pay. Teachers are paid for performing certain tasks, which is a fine-tuned way of paying them for their time.¹⁶

Paying teachers for specific inputs can mean that when those inputs are not provided — e.g., when classes go unprepared — they are not paid. More typically, task-based pay is implemented by threatening to sack the worker when required tasks are not performed, or when they are performed badly. To be effective, such a threat needs to be credible, and the institution of rules and procedures for dismissal (and appeal) is clearly necessary.

If the possibility of losing her job is to provide incentives for a teacher to perform, then dismissal must be sufficiently costly. The obvious way to make losing a job undesirable is to pay a teacher *more* than she can expect to earn in the outside market. This is one possible justification for paying teachers, and other civil servants, higher salaries, even if they cannot be closely related to on-the-job performance.¹⁷ However, in Jamaica, where unemployment was above 10 percent in 2001,¹⁸ teachers might rationally expect to have some difficulty finding a job if dismissed, even at a similar wage to what they are currently paid. Thus, in an environment with high unemployment, modest salaries may still provide sufficient incentives for teachers to avoid dismissal.

Outcome-Based Pay

One reason to pay teachers according to their output — e.g., as a function of student results — is simply to provide incentives. Any list of specified tasks is likely to be incomplete, and teachers will have discretion over how well to satisfy them. Some actions of staff — conscientious attention to student needs, keeping up with new content, etc. — might be less easily specified and monitored than others (like showing up on time). When these tasks cannot be paid for directly, it is desirable to pay for something that is correlated with their provision, that is, good outcomes. Some form of outcome-based pay might then be desirable, as a way of inducing the provision of hard-to-specify and monitor actions. This kind of performance-based pay should complement, not replace, input-based pay (i.e., payment according to the performance of specified tasks).¹⁹

There are many reasons that paying for results, while it sounds like an obvious idea, might have limitations. First, if the outcome indicator used is student performance, teachers' actions may constitute one of a large number of other determining factors, such as student ability, socioeconomic status, parental involvement, etc. Isolating the effect of the teacher could be problem-

¹⁶ In most jobs, people are paid differently if they do different tasks.

¹⁷ This is the basis of Shapiro and Stiglitz's (1984) efficiency wage theory of unemployment ("Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review*, 74, 433-44). Russia's civil servants, who are some of the lowest paid in the world, were recently granted a 50 percent wage increase with the aim of fostering greater responsiveness to client demands.

¹⁸ Source: <http://www.statinja.com-stats.html>

¹⁹ The Price Waterhouse study suggested paying teachers on the basis of certain indicators of task fulfillment, such as punctuality, etc., but not on the basis of student achievement.

atic. Second, relating teacher pay to student performance could expose teachers to volatile earnings, if student quality varies over time. Third, student test scores might indicate attainment of certain skills, but not others — like creativity, problem solving ability, or deeper understanding. Paying for test results might induce teachers to “teach to the test” instead of giving their students a broader education.²⁰ Finally, schools may target brighter students for enrolment, thus hoping to cherry pick the better students and reap the consequent rewards.

It could be argued that these concerns are more significant in situations with relatively advanced education systems. A basic goal of Jamaica’s school system is to make sure children leave school literate and numerate. These relatively simple goals are easy to test for. The impact of student ability and other factors could be corrected for by linking pay not to raw test results, but to improvements in test results over previous years. Whether rewards for student performance should be teacher-specific or school based is discussed in Section 5 below.

Qualification-Based Pay

Jamaica’s teachers are currently paid on the basis of their formal qualifications, their length of service, and their post. Certain posts — particularly those of Vice Principal and Principal, entail the performance of nonteaching tasks. Amongst teachers, however, salaries vary by qualification, arguably for the performance of the same job. An obvious reason for this variation is that higher qualified teachers are likely to be better teachers, but this observation is not enough to justify paying them more.

As pointed out above, abstracting from incentive-pay issues, the government should pay teachers what they are worth (or at least, what the marginal teacher is worth) in the private sector. If better-qualified teachers can earn higher incomes in the private sector, their teaching salaries will need to be higher.

Here a distinction between general training and teacher training is important. University graduates are likely to be more productive across a broad range of occupations, so will generally command higher wages in the private sector. They will need to be paid a premium to get them to work as teachers. However, it is not clear how much more productive graduates of teacher training colleges will be outside the teaching profession. In an extreme case, if teacher training left a person’s nonteaching productivity unaffected, then the salary needed to attract such individuals away from other employment would be unaffected by their qualification, and there would be no need to pay a premium for teachers with such training.

Clearly there would be little incentive for individuals to undertake teacher-specific training if this salary policy were adopted. The appropriate course of action for the government, however, is to subsidize the cost of teacher training (including, perhaps, paying for forgone earnings during the training period), but not necessarily to pay such trained teachers more once they are trained.

²⁰ Sometimes the teacher might even take the test!

In practice, of course, completing teacher training is likely to give an individual both teacher-specific skills and more generally applicable skills, such as organizational and management skills. Thus teacher training will increase, to some degree, the person's productivity in alternative employment, and will necessitate the payment of a higher wage. These higher future wages would reduce the need to subsidize the cost of teacher training.

An important form of teacher training may be teaching itself, if the benefits of experience outweigh the possible watering down of youthful enthusiasm. Once again, however, pay should increase with experience to the extent that such experience increases the wage that an individual can command in alternative employment.²¹

This discussion has been predicated on the notion that the government wishes to employ a certain number of teachers of different qualifications — high school graduates, trained teachers, university graduates, etc. In practice however, the mix of different types of teachers will be a function of the wages that need to be paid to attract them to the profession. Thus if alternative employment prospects improve for university graduates but not for others, graduates will become relatively more expensive, and the government may wish to substitute into either trained or untrained nongraduates. Similarly, the prospects of teachers of certain subjects, such as mathematics and science, could change, forcing either higher salaries or reduced recruitment. An example of such a shift in the supply curve arose from the recruiting activities of U.S. and UK schools in 2000-01.

4. Pay Scales in Jamaica

Teachers in Jamaica are paid according to a series of pay scales and the post they hold. In 2001 annual salaries at the mid-point of each scale — presented in Figure 4 — ranged from J\$298,000 for pretrained teachers to J\$1,024,000 for principals of the larger secondary schools. Figure 4 also includes average labour earnings per worker for 2001, which were estimated to be J\$212,000,²² and a poverty line for a family of five.²³ Finally, the figure includes a very rough

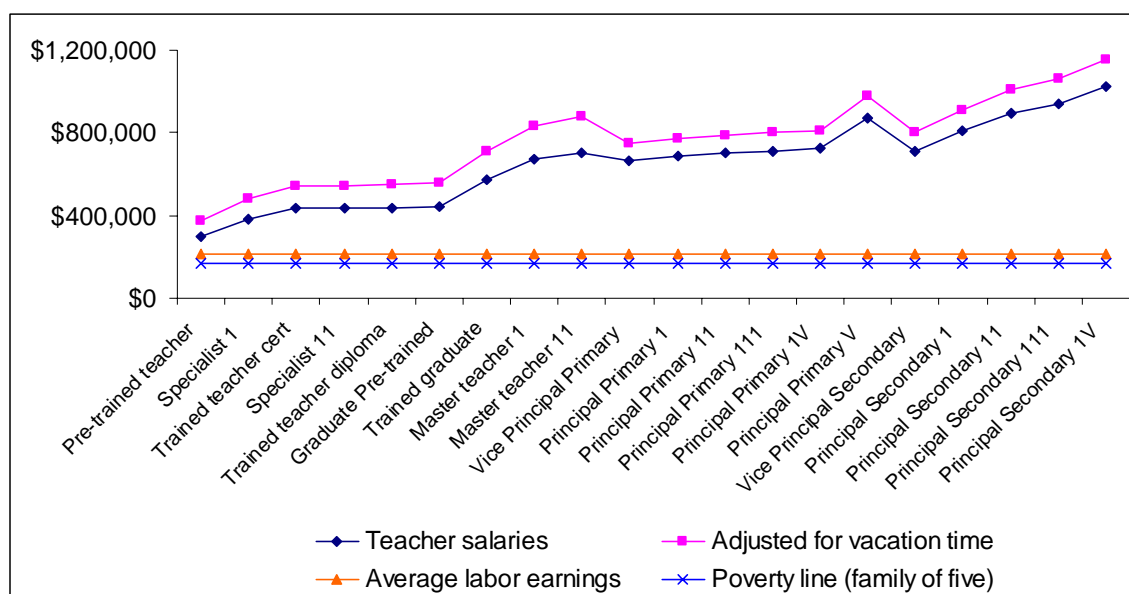
²¹ One reason the money wage might increase with experience even if wages in alternative employment do not increase is that the teacher's labour supply curve might shift in. For example, if experience increases the costs of teaching (e.g., associated with the cumulative effects of stress), then in order to retain the teacher, the money wage will have to exceed the wage in alternative employment by an amount equal to these additional costs. This strategy would need to be compared with employing a less experienced teacher at a lower money (but same net-of-stress costs) wage.

²² Nominal GDP was J\$334.7 billion, and employment 1.1048 million. Average labour-market earnings are calculated on the assumption that all workers are full time, and that the share of labour in GDP is 70%. Source: Statistical Institute of Jamaica, <http://www.pioj.gov.jm-statistics>.

²³ The poverty line is calculated by adjusting the 1999 poverty line of J\$146,261.5 (as used in the Jamaica Survey of Living Conditions) for changes in the CPI. The starting salary for a pretrained teacher — the lowest salary in the teaching profession — is about J\$275,000. This is still above our estimate of mean labour earnings of J\$212,000.

estimate of teacher salaries adjusted for the effects of vacation time.²⁴ These data suggest that, compared with other Jamaicans, teachers are not as badly off. It should be noted that this observation does not necessarily tell us whether teachers are paid “enough” — that is, enough to induce a sufficient number of sufficiently able people to become teachers — but it does suggest that domestically financed teacher pay increases would not serve a direct poverty reduction purpose, nor necessarily improve the distribution of income in Jamaica.

Figure 4: Teacher Salaries at the Midpoint of Each Salary Range



This study is however more focused on the *structure* of teacher pay, and not its *level*. The structure of teacher pay is determined jointly by formal pay scales and posts. In Jamaica these scales and posts sometimes coincide, but sometimes do not. To clarify, the pay scale grades are as follows:²⁵

²⁴ It is assumed that for members of the teaching staff, on average three quarters of the year is spent teaching, and that outside this period their time is worth the same to them as the wage paid while teaching. It is assumed that vice principals and principals, who may be required to do administrative work but at a possibly lower intensity, work at a rate of 50% during vacation periods. These assumptions are no doubt open to criticism. The intent here is only to arrive at some quantitative appraisal of the “real” incomes earned by teachers. See Liang (2000).

²⁵ There are further grades for teachers in tertiary institutions.

Table 9: Salary Scale Grades and Qualifications

| Salary Scale Grade | Qualifications |
|----------------------------------|---|
| Pretrained teacher | Secondary school graduate |
| Specialist I | Special technical skills, e.g., woodwork |
| Trained-teacher (certificate) | Secondary school graduate with teaching certificate |
| Specialist II | Special technical skills, e.g., woodwork |
| Trained-teacher (diploma) | Secondary school graduate with teaching diploma |
| Graduate pretrained | University graduate without teacher training |
| Trained graduate | University graduate with teacher training |
| Master Teacher I | |
| Master Teacher II | |
| Vice Principal (primary) | |
| Principal (primary) (5 levels) | |
| Vice Principal (secondary) | |
| Principal (secondary) (4 levels) | |

Each salary scale grade has a number of levels – for example, pretrained teachers can get salary increments in 14 steps above the base wage, while principals have 6 salary levels within each grade (there are different grades for principals at different types of schools). Once a teacher is given a grade, she progresses up through the levels of that grade as she accumulates experience in the position.

It is useful to distinguish between two broad kinds of jobs undertaken by the nonsupport staff of a school, which I shall call teaching and management. These jobs generally require different kinds of skills and levels of experience. Those holding management positions — i.e., principals and vice-principals — can also to engage in some teaching duties.

The salary scale according to which a member of the regular teaching staff is paid depends virtually entirely on her qualifications. The only exception is for Master Teachers, who occupy one of two salary scales, depending on their qualifications (as is the case for other teachers) *and* an evaluation of their performance, e.g., by their peers. Thus apart from the transition to Master Teacher or to management positions, teachers can progress from one salary scale to the next if and only if they attain further qualifications. In this sense, promotion across grades in the pay scale is not “performance-based,” although one expects that teachers who perform better might be more likely to be granted the opportunities to engage in further study more readily.²⁶

²⁶ After two years of service, teachers are entitled to a full year of paid study leave, and after 10 years they are entitled to 2 years of paid study leave. However, the government limits to 10 percent the number of teachers at any

Within the management positions, individuals are allocated primarily by experience and performance. That is, there is no formal requirement that a vice-principal have a certain qualification (e.g., a post-graduate degree) in order to progress to the position of principal. This does not, of course, mean that a higher degree would not improve the chances of an individual progressing to the principal level.

A second determinant of pay, separate from a teacher's qualifications, is her *post*. The posts that teachers can occupy, and the distribution of teachers across posts as they stood in 1998-99 and 2001-02, are presented in Table 10:²⁷

| Post | 1998-99 | 2001-02 |
|--------------------|----------------|----------------|
| Specialist | 5.7% | 5.0% |
| Pretrained teacher | 18.7% | 15.3% |
| Trained teacher | 52.2% | 55.7% |
| Senior teacher | 16.5% | 16.8% |
| Master teacher | - | 0.05% |
| Vice-principal | 2.8% | 2.8% |
| Principal | 4.1% | 4.3% |

Source: Jamaica Education Statistics, 1998-99, Table 2-2.

Posts can be thought of as formal titles assigned to teachers. One purpose is to describe the particular job that is required — e.g., principals perform different tasks from trained teachers. Another potential role of the post is to bestow some kind of visible recognition or status on a teacher, instead of just increasing her wage.²⁸ Some posts — e.g., pretrained teacher, specialist, vice-principal, and principal — have their own pay scale grades.²⁹ Teachers with other posts, including trained teacher and senior teacher, can in principle occupy one of a number of pay scale grades. Figure 5 shows the relationships between salary scale grades and posts.

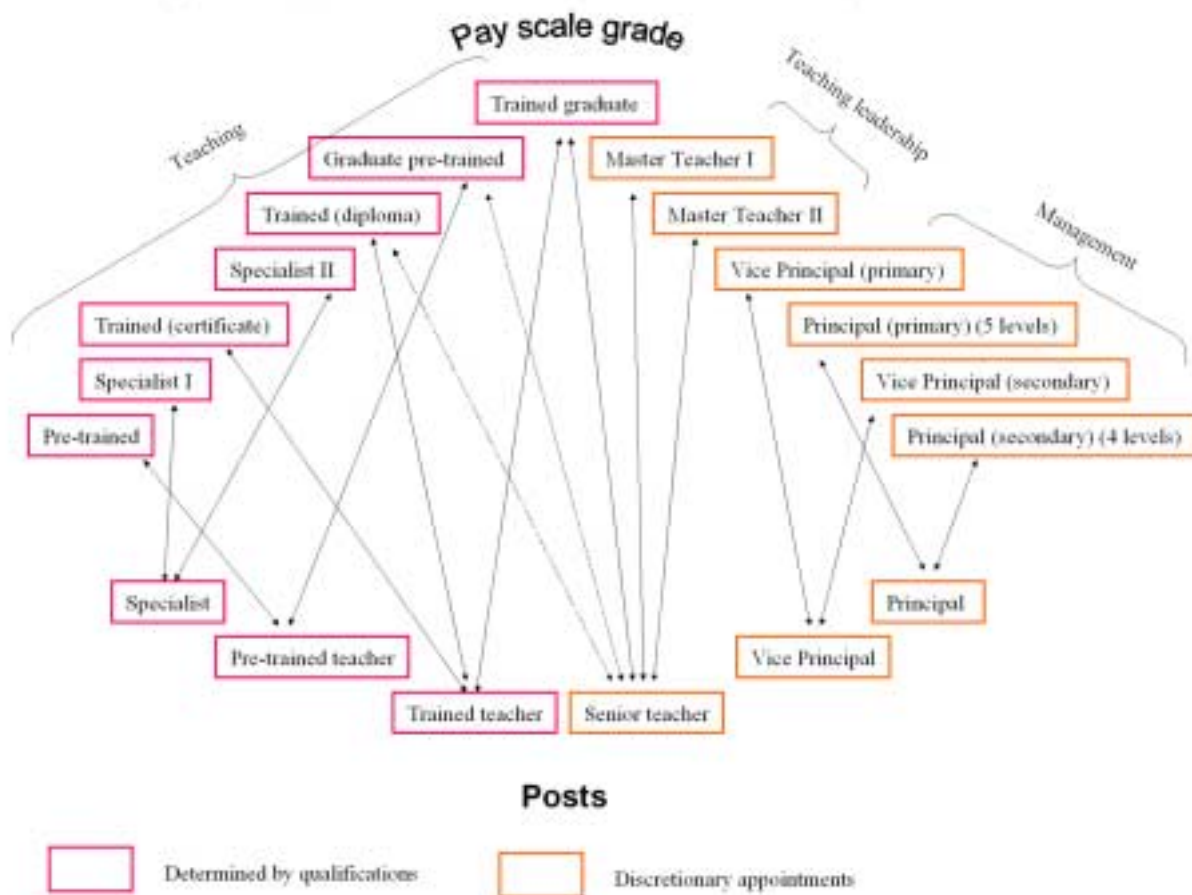
school who can be on study leave in any given year. When this constraint binds, the choice of recipients of study leave opportunities could well depend, at least implicitly, on applicants' performance.

²⁷ A small number of teachers have posts of work experience teacher and librarian.

²⁸ It is always difficult to establish how workers value status compared with money. Some theories suggest that they are complementary, so that higher formal status should be given in conjunction with higher salaries in order to provide strong incentives.

²⁹ In fact, the post of principal has many. The post of principal can be held at either a primary or secondary school. Within the primary school category there are 5 levels and within the secondary school category there are 4 (depending on the size of the school). The post of vice-principal can be held at primary or secondary schools (with no distinction across school sizes).

Figure 5: Salary Scale Grades and Post in the Jamaican Education System



Apart from potentially conferring some form of prestige, the post of senior teacher has the effect of augmenting an individual's income above that which she earns due to her position within the pay scale grade that she occupies. For example, a teacher on a given pay scale would receive a bonus equal to 10% of the minimum Trained Teacher Diploma Scale upon being appointed to the post of senior teacher.³⁰ Thus senior teacher status can be thought of as accelerating progression through a particular grade. Teachers at this level are, however, expected to engage in certain activities of a slightly more managerial nature, for example organizing extracurricular activities.

This discussion suggests that incentives for on-the-job performance are provided by the prospect of promotion to senior teacher, master teacher, or management positions. There are naturally a limited number of management positions available (in 1998-99 principals and vice-principals made up less than 7 percent of the teaching and management staff in all schools³¹), and it is rational for a teacher to assume the probability of winning a promotion to the management ranks is low. In order that such a possibility provide a moderately strong incentive to perform, the additional pecuniary benefits must be significant.³² This is one reason why senior executives in private sector companies might get paid much more than their apparent productivity — as an incentive to lower level workers. However, it exposes teachers to significant risk to their lifetime earnings, as only the lucky few make it to principal level. It also provides little incentives for those who dislike management. For these reasons, the position of master teacher was introduced, effectively increasing the chance that an individual teacher can move to higher-paid positions, and increasing the desirability of such a move for those disinclined to enter the management ranks. However, so far, the number of master teachers has remained small, so the effect on performance incentives of lower-level teachers may be attenuated.

In 1998-99, across all school types, the ratio of senior teachers to trained teachers was about 31.5 percent, and they made up about 17.6 percent of the nonmanagerial teaching staff.³³ Thus the prospects of promotion to senior teacher were relatively good, compared to those for promotion to principal or vice-principal. The post of senior teacher also helps to provide incentives for teachers earlier in their careers, since the prospect of making it to principal one day in the distant future may have little impact on the incentives of young teachers when they discount the future, even if the wage differentials are high.

While the prospects of promotion to senior teacher, master teacher, and management positions may provide incentives for teacher performance, the prospect of transition amongst the other pay scale grades provides little such incentive, precisely because promotion is not a function of performance. Of course, if better trained teachers are better teachers, and if they have better outside labour-market options, then paying them more is appropriate. On the other hand, there

³⁰ In fact, there are three level of Senior Teachers, ST1, ST2, and ST3. ST1s get 10%, ST2s 15%, and ST3s 20%.

³¹ Source: Jamaica Education Statistics, 1998-99, Table 2-2.

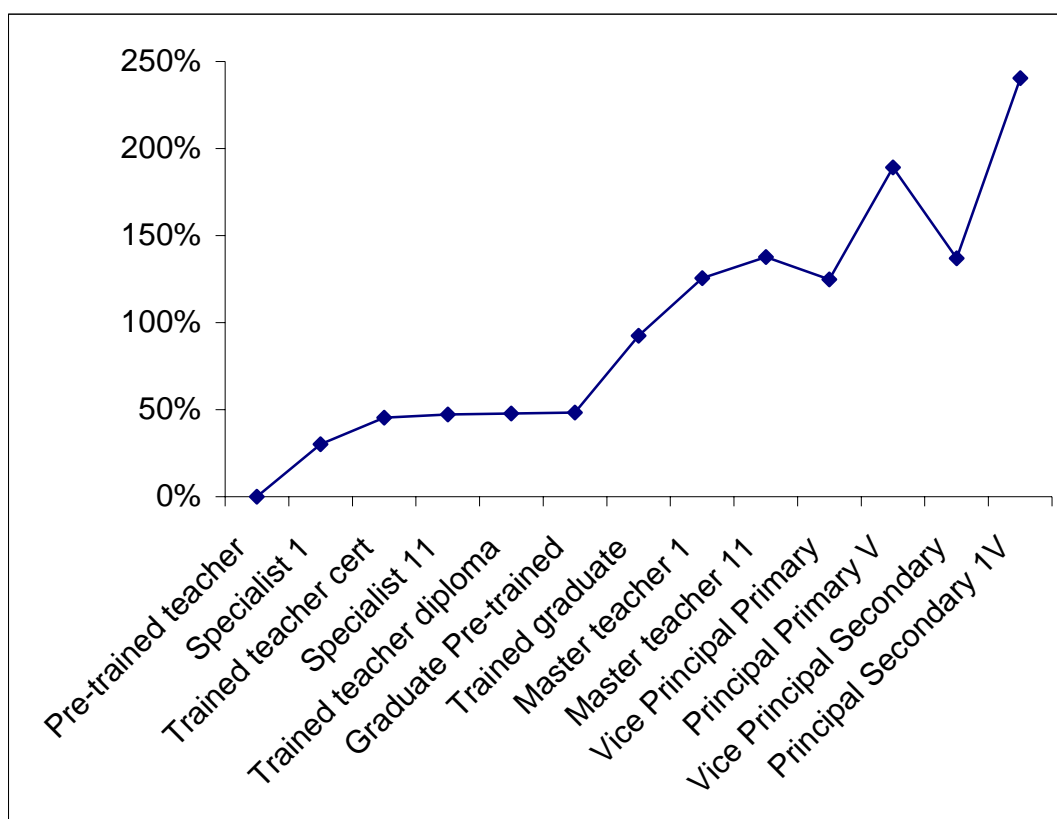
³² That is, a promotion with low probability but high wage increase can provide similar incentives to a promotion with high probability but modest wage increase.

³³ Source: Jamaica Education Statistics, 1998-99, Table 2-2.

is no compelling evidence that either of these effects is operative, at least with regard to teacher training (as opposed to university education).³⁴ As cited above, trained teachers don't seem to produce better test results, and it is unlikely that they face significantly better labour-market opportunities.

In fact, Figure 6 shows that the premium earned by a teacher above the rank of pretrained teacher is virtually constant for all teachers except for trained graduates, master teachers, and those with management positions. The consultant encountered a number of concerns from teachers and others regarding the lack of increase in base salaries for those with teaching certificates, teaching diplomas, and university training, but at least some of the pattern illustrated in Figure 5 may be appropriate.

Figure 6: Salary Premia over Pretrained Teacher (Base Salary for Each Grade)

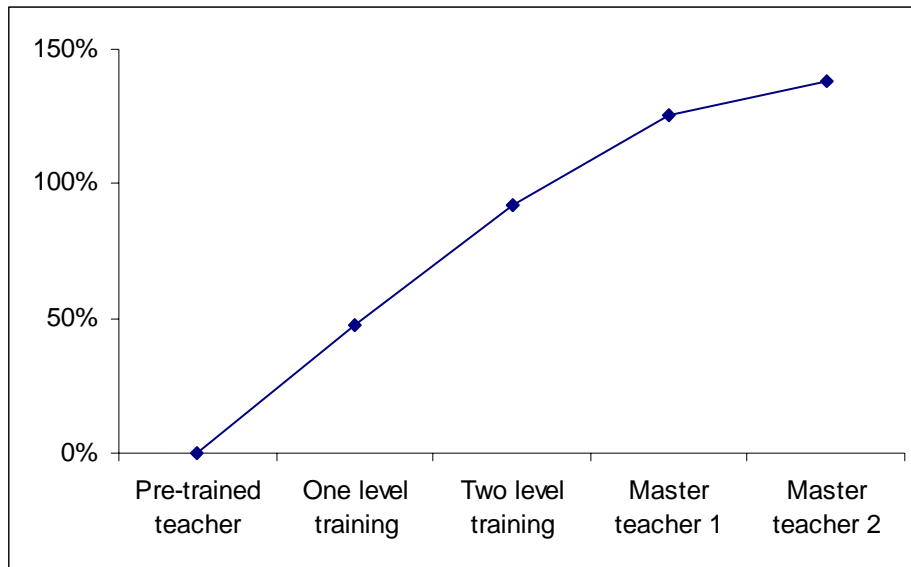


A useful exercise is to consider two alternative career paths in the teaching profession — that of a professional teacher and that of a manager. The idea is that professional teachers pro-

³⁴ Most of the teachers recently recruited by U.S. and UK school districts have had university degrees.

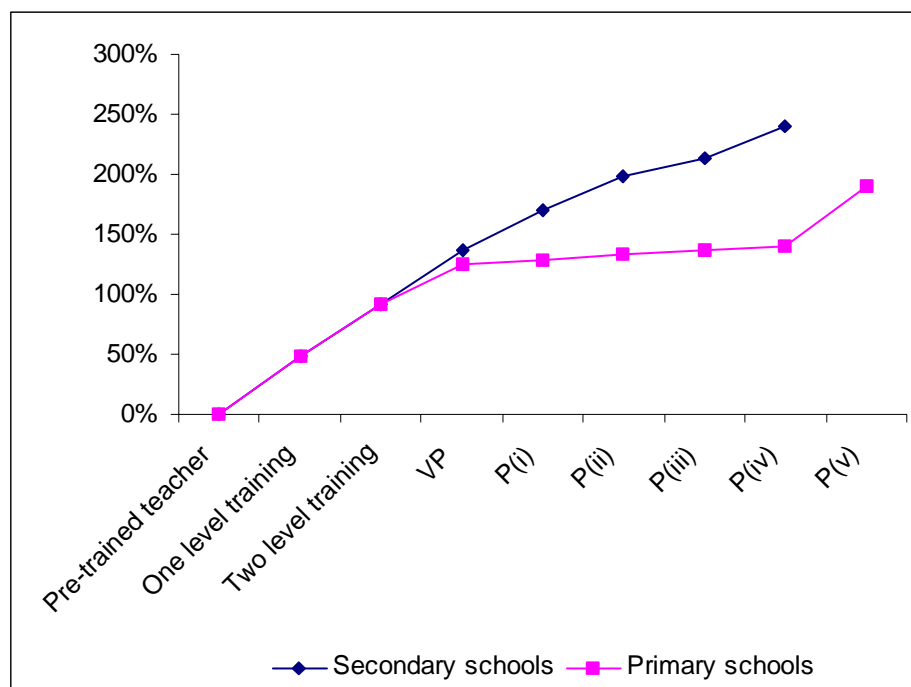
gress, eventually and if they are good enough and lucky enough, to the position of master teacher, while managers progress through the teaching ranks into positions as principals and vice-principals (again, depending on skill and luck). Figures 7 and 8 present the evolution of (base) salaries through this career progression for these two career paths respectively. In the figures, all pay scale grades with one level of training above high school (that is, trained teacher-certificate, trained teacher-diploma, and pretrained graduate) are combined into a single category called “one level training,” while trained graduates are labeled “two level training”.

Figure 7: Career Path for Professional Teachers: Salary Premium over Pretrained Teachers



Within the *professional teacher career path*, the increase in (base) salary is close to linear, until the transition from the first to second master teacher levels, when the rate of increase falls.

Figure 8: Career Paths for Managers: Salary Premium over Pretrained Teachers³⁵



Within the *management career path*, there is a clear divergence between primary and secondary school salary progression. There may be differences in the skills needed or the difficulty of presiding over secondary versus primary schools that would warrant different pay *levels* for principals in the two types of school. However, of more interest is the difference, between the primary and secondary systems, in the *pattern* of salary increases from the level of vice-principal to that of principal of the highest level school. For secondary schools, the increase is gradual and approximately uniform, while for primary schools the base salary is essentially constant for vice-principals through principals of level (iv) schools, but jumps suddenly for principals of level (v) schools.

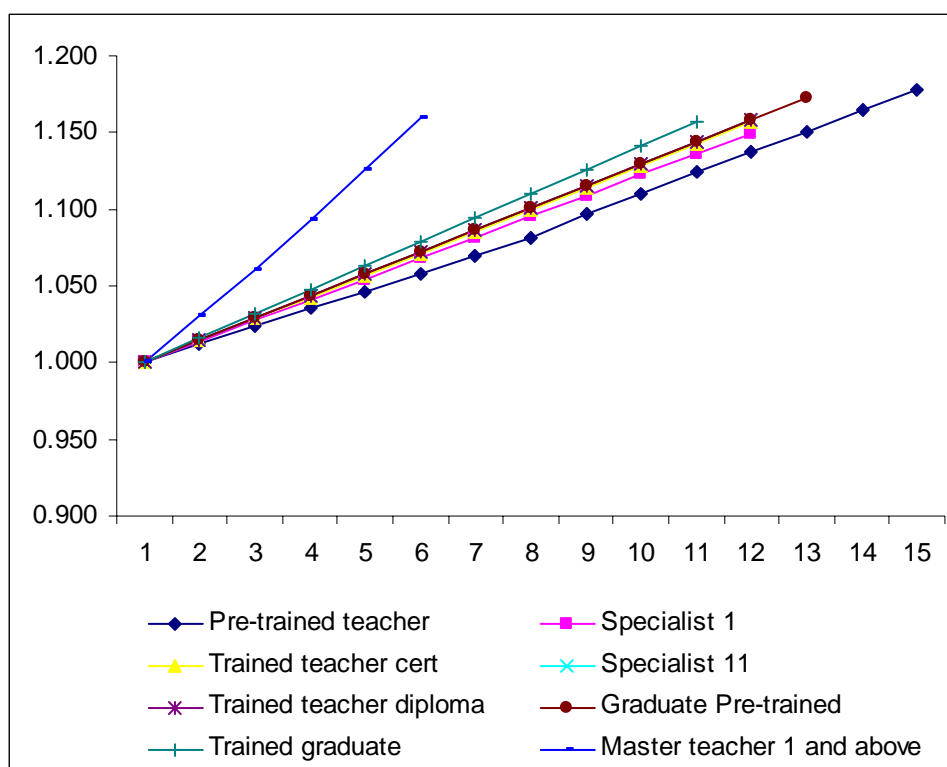
Each of these patterns has its potential merits. If managing larger schools takes progressively more skills (which are marketable in outside jobs) then principals of larger schools will need to be paid progressively more. On the other hand, having attained a position of vice-principal, the prospect of appointment to the post of principal at progressively larger schools might be used as an incentive device. Offering a large reward (i.e., salary) for principals at only the largest schools could provide incentives to managers of all other schools. While both of these patterns can thus be supported on theoretical grounds, the difference in patterns between primary and secondary schools is harder to rationalize.

³⁵ VP = Vice-Principal, P(x) = principal of a level x school, x = i, ii, iii, iv, v.

Within-Grade Increments

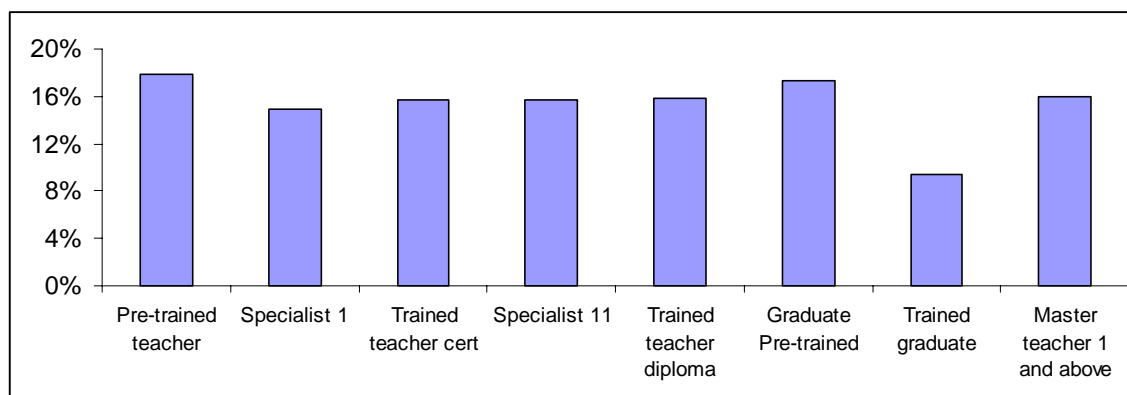
Within each salary scale grade, wages increase in increments. For master teachers and those with management positions (vice-principals and principals), salaries increase at 3% per year. For lower rank teachers, the rate of increase varies from 1.1% for pre-trained teachers to 1.5% for trained graduates, with the salaries in most other scales increasing at about 1.3 to 1.4% per year. The cumulative effects of these increases are shown in Figure 9.

Figure 9: Salary Increases by Pay Scale Grade³⁶



Note however that the number of increments is much larger for lower-level jobs than for the higher ranking positions. Thus managers and master teachers reach the maximum compensation earlier than others (conditional on staying in the same pay grade). Consequently, the cumulative increase from the beginning to the end of each scale is nearly constant at about 16 percent across scales, as illustrated in Figure 10. The only exception to this rule is for trained graduates, whose salaries increase by just 9 percent.

³⁶ Source: Salary scale data.

Figure 10: Cumulative Increase in Salary by Pay Scale Grade

5. Possible Reforms of the Structure of Teachers' Pay

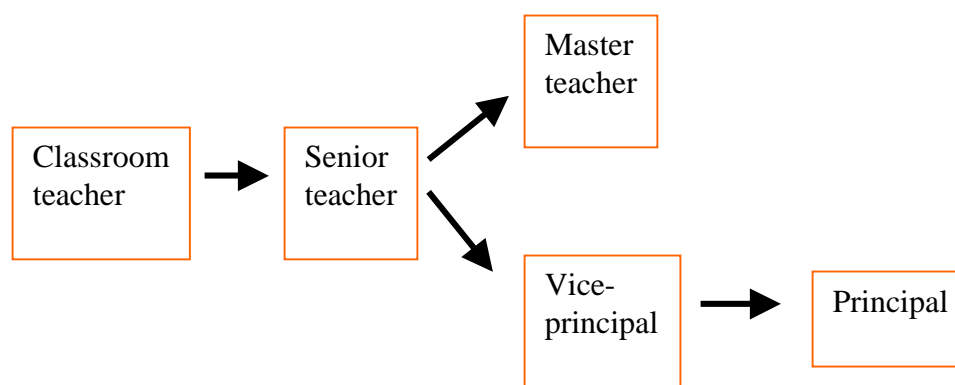
The preceding discussion of post, grades, and scales suggests a slightly unwieldy and sometimes confusing system of paying teachers. On the other hand, the costs associated with these complications do not necessarily seem to be offset by beneficial effects on the system's ability to attract and retain good teachers, or to provide them with strong performance incentives. In this section, some rationalization and modification of the structure of teachers' pay is suggested, based on the conceptual and descriptive analysis of the preceding two sections. These suggestions are aimed at keeping the original intent of the pay structures intact, while simplifying and fine-tuning them.

It is proposed to classify nonsupport staff in schools (i.e., teachers and managers) according to three components: the functional attribute of the jobs they hold, their educational (or other relevant) qualifications, and their job titles or posts. The functional component will simply include two attributes: teaching and management; the qualification component would include as few as three levels: high school graduate, trained teacher, and university graduate; and job titles or posts would include two or three levels, depending on the functional component.

| Table 11: Classification of Teachers and Posts | | | |
|---|-------------------|---|-----------------------|
| Attributes | Functional | Organizational Component Qualification | Job Title-Post |
| | Teaching | | High school graduate |
| | | Teacher training | Senior teacher |
| | | University graduate | Master teacher |
| Management | | | Vice-principal |
| | | | Principal |

Within this organizational setup, a typical new teacher would start in the teaching function component at the level of classroom teacher, and progress according to one of two career paths shown in Figure 11. Along one path, the individual remains in the teaching functionality and attains at most the post of master teacher. Along the other, after reaching the level of senior teacher the individual makes a transition to the managerial functionality, attaining at most the post of principal.

Figure 11: Career Paths

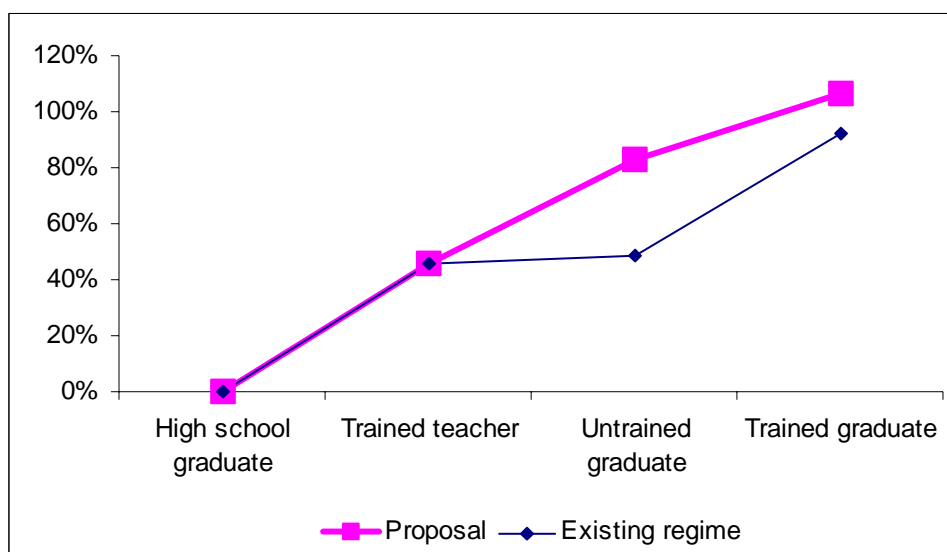


School staff would be paid according to their qualification and post, as illustrated in Table 12. Certain posts would be unavailable to individuals without sufficient qualifications (cells indicated by a ×). An individual's salary would generally increase with her qualification, reflecting the better outside options she faces in the labour market. Within each functionality (teaching or managerial), her salary would increase with her post. Job tasks would change with post (e.g., more responsibility, curriculum design, management of more staff, etc.), but the main function of

the stratification by post would be to provide performance incentives. Thus teachers could earn higher salaries by becoming better qualified, by performing better on the job, or both.

| Table 12: Teacher Salaries by Post and Qualification | | | | |
|---|-------------------|----------------------|-------------------------|----------------------------|
| | | Qualification | | |
| Functionality | Post | High School | Teacher Training | University Graduate |
| Teaching | Classroom teacher | \$ | \$ | \$ |
| | Senior teacher | × | \$ | \$ |
| | Master teacher | × | × | \$ |
| Managerial | Vice-principal | × | \$ | \$ |
| | Principal | × | \$ | \$ |

Precisely how wages vary along the qualification and post dimensions is important. For the qualification dimension, let us reconsider the left hand parts of Figures 7 and 8. In both figures, teachers with one level of training (teacher training or university degree) earn about 50 percent more than pretrained teachers, and trained graduates earn 50 percent more again. It is proposed that the salaries be differentiated now by the three qualifications in Table 12, and that the shape of the wage profile be altered. An example is shown in Figure 12. The thin line represents the wage premium earned by individuals with more than a high school education under the existing regime. Under this regime, little differentiation is made between trained teachers and university graduates (the flat part of the line), but holders of both qualifications receive a relatively large bonus (the steep part to the right). The proposal, represented by the bold line, is to differentiate more between trained teachers and university graduates (the steeper middle part of the bold line), but to give relatively weaker (but still positive) financial incentives for university graduates to undertake teacher training (the flatter part of the bold line at the end).

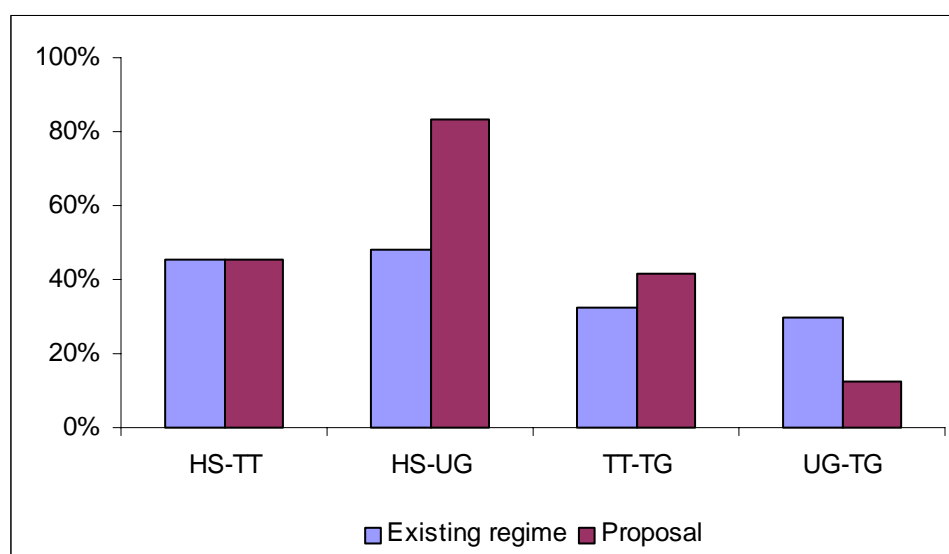
Figure 12: Existing and Proposed Wages for Teaching Staff

This change in the pattern of salaries induces a change in the increments earned upon attainment of further qualifications. Figure 13 illustrates the increment in wages earned by an individual making four different transitions: from high school graduate to trained teacher (HS-TT), from high school graduate to untrained university graduate (HS-UG), from trained teacher to trained university graduate (TT-TG), and from untrained university graduate to trained university graduate (UG-TG). Under current practices, a high school graduate earns an additional 45% or 48% upon receiving teacher training or a university degree, respectively. Becoming a trained university graduate earns a trained teacher an additional 32%, while it increases a university graduate's salary by 30%. This confirms the idea that the current system rewards the *number* of qualifications, but does not differentiate strongly across *types* of qualifications.

The proposed salary scale would retain the increment a high school graduate earns from acquiring teacher training.³⁷ However, it would increase — indeed nearly double, from 48% to 83% — the increment such a high school graduate would earn from instead acquiring a university degree. In order that salaries of trained university graduates remain affordable, this increase at the lower end requires an offsetting smaller increment at the high end. Thus, a university graduate attaining teacher training would receive a wage increment of about 13% instead of the existing 30%.

³⁷ The option of reducing this increment could be considered, particularly in light of the evidence suggesting that teacher training alone contributes little to student performance. However, political realities suggest such a reform would be vigorously opposed by the Jamaica Teachers' Union.

Figure 13: Existing and Proposed Wage Increments for Additional Qualifications



Evidence suggests that one of the main benefits of a university degree derives from the mastery of content that a teacher acquires at university. Some university degrees provide such training in areas that are of perhaps limited use in schools, e.g., counseling, guidance, and even teacher training (i.e., learning how to train teachers). Even within those subjects that are directly relevant for school teaching, some — e.g., mathematics, physics, and English — may be more highly valued than others — e.g., psychology, etc. The government should certainly consider, for the purposes of paying teachers, recognizing only those degrees that are relevant to the education of children. It should also consider the possibility of making the size of pay increments depend on the type of university degree attained. For example, paying a premium for mathematics graduates addresses both supply and demand concerns. This is because the employment prospects for such graduates are generally better so they need to be paid more (a supply-side issue), and because the performance of students in mathematics in particular would appear to be in need of serious attention (a demand-side issue).

With the proposed structure, university graduates will have a smaller incentive than before to seek teacher training, but teachers in general will have stronger incentives to become university graduates. Also, many individuals find it easier to enter university if they have successfully completed a teacher training course (World Bank, 1999), so that the supply of university graduates with teacher training would not necessarily fall precipitously. If it transpired that a significant number of untrained university graduates were not pursuing teacher training, and this was perceived to be detrimental to their performance, they could be encouraged to do so by paying

the costs of such training (including forgone wages), but with the understanding that their salaries upon return would be increased in accordance with Figure 13.³⁸

As well as getting paid for their qualifications, individuals are paid according to their post. The simple idea is that the prospect of promotion to a higher post and higher future salary provides incentives for current performance. It is important to *not* link promotion to senior teacher status directly to the acquisition of further qualifications. This way, teachers with different qualifications all have incentives to perform. It also means that promotion should not be based on student performance alone (for example), since this is likely (hopefully!) a function of a teacher's qualifications as well as her on-the-job effort. Instead, promotion needs to be based on some indicators of sustained commitment to quality teaching and conscientious fulfillment of teaching tasks. Similarly, despite the name, senior teacher status should not be based directly on seniority (although it must be to some extent, if applicants for promotion are to have had a chance to show "sustained" performance).

One way to include post-based pay in total compensation would be to add a post-specific dollar amount to an individual's qualification-based pay. (This is the way senior teachers are paid under the existing system.) That is, if y^q is an individual's salary based on her qualifications, then her total compensation might be

$$y^{\text{total}} = y^q + y^p$$

where y^p is an amount that depends on the post.

Instead, it is suggested that wage increments upon promotion from one teaching post to another reflect the level of qualifications an individual possesses. One possible specification is that total compensation be calculated as

$$y^{\text{total}} = y^q (1+x^p)$$

where x^p is a post-specific proportionate increase in the base salary. For example, promotion to the post of senior teacher might yield a classroom teacher a 10 percent ($x^p = 0.1$) increase in her salary. The intuition is that a fixed dollar increase in salary may have a smaller effect on the incentives of a relatively highly paid teacher (who doesn't "need" an extra dollar of income so much) than it would on the incentives of a lower-paid person.

³⁸ Many teachers may find this an attractive proposition, providing them with some time out of the classroom while they suffer no reduction in pay.

In addition, this scheme would strengthen incentives of trained senior teachers (i.e., STs with teacher training only) to acquire a university education, as their senior teacher status would be worth proportionately more.

The expenditure implications of changing the pay levels and number of senior teachers can be straightforwardly approximated. We assume (although this is not necessary) that the transport allowance for senior teachers is retained under any reform. The current expenditure on senior teachers (in addition to their base salaries and the transport allowance), is

$$E_0 = b \times y_{\min} \times n_{ST}$$

where b is the current percentage senior teacher bonus (we assume that this is on average 15 percent³⁹), y_{\min} is the base to which it is applied (i.e., the minimum salary of a trained teacher with a diploma, currently J\$406,997), and n_{ST} is the number of senior teachers (currently 3,690). Thus expenditures on bonuses for senior teachers are estimated to be about J\$225 million.

Increasing the number of senior teachers by a factor v and applying an average bonus rate β to all base salaries y_{all} yields bonus expenditures of

$$E' = \beta \times y_{\text{all}} \times (1+v)n_{ST}.$$

Doubling the number of teachers ($v = 1$) clearly doubles expenditures. Applying the percentage bonus to actual salaries earned by senior teachers increases expenditures by a factor of $(v_{\text{all}} - y_{\min} - 1)$, which we estimate to be about 10 percent.

Of course, we have indicated in Table 12 that different posts may require different minimum levels of qualification. Thus if promotion to the post of master teacher requires a university degree, the question of whether the salary increment for master teachers is fixed or proportional to the qualification-based pay earned by a senior teacher is moot.

It is less obvious that promotions to managerial posts (vice-principal and principal) should attract proportional wage increases, or whether the holders of these posts should be paid a fixed salary independent of qualification. We propose following the latter course of action, as under the current system, partly because we expect that most principals, especially those at secondary schools, should be similarly qualified, having a university degree.

Within the managerial functionality, salaries currently vary by post (vice-principal versus principal), and depend on whether the school is a primary or secondary institution. For princi-

³⁹ 15% is the simple average of the three percentage bonuses earned by the three grades of senior teacher, 10%, 15%, and 20%.

pals, pay is also a function of the size (and other characteristics) of the school, as described in Figure 8. Some individuals have made the observation that while there are multiple levels of principal, depending on the size of the school, there is only a single vice-principal pay scale for positions at primary and secondary schools (one for each). They have argued that the position of vice-principal should be similarly partitioned according to school size. However, as larger schools tend to have more vice-principals, the per person work load is unlikely to increase with school size as quickly (if at all) for vice-principals as it does for principals. Maintaining a single post of vice-principal is appropriate.

As for the variation in principal pay by type of school, if a similar pattern to that shown in Figure 8 is to be retained, then it would appear to be sensible to redefine just two classes of primary school, rolling types (i) through (iv) into a single category, and separating this from type (v), which is the only one in which principals are paid a significantly different wage. Alternatively, if the current classification of primary schools is meaningful, then principals' salaries should perhaps increase more uniformly from type (i) through type (v), as is the case for secondary school principals.

Finally, given that a teacher occupies a particular qualification-post category, the question of how her wage should change over time (i.e., with experience) should be addressed. The current pay scales provide for very slow increases over time, but since these scales are renegotiated every two years, the projected increments are not necessarily indicative of realized wage movements. Since the qualification- and post-based components of wages are meant to respond to productivity changes, it may be more advisable to simply link future wages for the same qualification-post category to projected inflation.

Annual Teacher Bonuses

We have argued that promotions, and the associated pay increases, might be used to provide incentives for workers. One feature of a promotion is that it usually represents a permanent shift up in the individual's salary — that is, good performance is rewarded with a permanently higher annual income. Another way to reward performance in a given year is to pay a single bonus that does not affect the individual's base salary in the following year.

However, the resources available for such bonuses are likely to be very limited, individual teacher performance evaluation is difficult to measure, and intensive teacher competition within a school could jeopardize school harmony. In view of these limitations, a better bonus scheme might provide a small amount of funds to well-performing schools for use on improvements to school infrastructure that benefit primarily teachers (e.g., equipment for or renovation of staff rooms). There would obviously be a need to calibrate school performance according to local conditions (e.g., teacher and student quality, income, etc.) in order to make such competitive bonuses effective. The easiest way to do this would be to compare *improvements* in performance (not the *levels* of performance) across schools. Of most importance is that the rules for allocating bonuses be simple, clear, and difficult to manipulate.

6. Pensions

This section first briefly addresses the effect of pensions on teachers' effective wages, and compares this with similar pension effects in the private sector. It then goes on to describe the pension benefit formula faced by retiring teachers, and finally presents some indicative simulations of the effects of wage and employment policy changes on pension liabilities.

The Wage Value of Teachers' Pensions

Teachers in Jamaica are eligible for a public pension upon retirement. The pension system is noncontributory, and benefits are paid out of general tax revenue. (In many other countries, public pension benefits are financed at least partially through an earmarked payroll tax.) Pensions are also payable to other civil servants with similar benefit rules, although there are a small number of provisions that are specific to the teaching profession. Private sector employees are sometimes offered pension plans as part of their employment contracts, but these nearly always require at least some contributions from employees, thus making direct comparison of civil servant and private sector wages less than fully informative.

Officials at the Ministry of Finance and Planning suggest that, to a rough approximation, if teacher pensions were funded by current contributions from wages, the required contribution rate would be about 25 percent. That is, the existence of pension benefits is equivalent to a 25 percent higher salary. In contrast, when private sector employers pay pensions, they typically make a contribution of 5% of the worker's wage, so that total wages are just 5% higher than reported.⁴⁰

This difference in the extent of realized contributions reduces the extent to which private wages exceed wages in the public sector. Thus, suppose the ratio of wages paid in the private sector to teacher wages is R . The ratio of effective wages — wages including implicit and explicit contributions — is $0.84R$.⁴¹ While this report is not intended to address equity or fairness issues across public and private sector wages, the benefit associated with implicit pension contributions suggests that simple comparisons of money wages could be misleading.⁴²

⁴⁰ Another comparison is with health sector workers, who are employed by regional health authorities. Employees pay a 5% contribution from wages, and the RHAs pay 5%, 7.5%, and 10% for employees working 0-5 years, 5-10 years, and 10-15 years respectively.

⁴¹ Let t be the wage paid to teachers and p the wage paid to private sector employees. Then $R = p/t$. Total wages paid to teachers are about $1.25t$ and total wages received by private sector employees are $1.05p$, so the ratio of total wages is $1.05p/1.25t = 0.84R$.

⁴² The vesting period of public sector pensions is 10 years, while that for private sector pensions tends to be between 5 and 10 years.

Pension Benefit Rules for teachers

The standard retirement age for teachers and other public servants is 60.⁴³ A pension is payable to retirees with a minimum of 10 years of eligible service. The value of a full pension depends on the number of months of service and the pensionable salary. The pensionable salary is defined as the average of the salary earned during the last three years of a teacher's career, including benefits (such as travel allowances, etc.).⁴⁴ In particular, the annual pension is

$$P = [\text{\#months of service} \times \text{pensionable salary}] - 540.$$

That is, for each year of service, a pensioner receives a benefit of 2.2% of her pensionable salary.⁴⁵ Thus a teacher retiring with 30 years experience finds that two thirds of her salary is replaced.

Teachers have the option of taking a lump-sum gratuity upon retirement, plus a reduced annual pension. The gratuity is

$$G = 12.5 \times P - 4$$

and the annual pension is reduced to $\frac{3}{4} P$. If the retiree lives more than 12.5 years after retirement, her annual pension reverts to the full amount, P . The gratuity thus represents an interest free loan — repayable over twelve and a half years — to pensioners, most of whom take up the option.⁴⁶

One provision of the pension system that is peculiar to the teaching profession is that to be eligible for a pension, an individual must work as a teacher for at least half the time between first starting as a teacher and finally retiring. This could be a disincentive for some individuals to re-enter the profession after spending a significant amount of time away from the classroom pursuing other careers.

⁴³ Teachers can work until the age of 65, with each additional year of work being counted towards their years of service.

⁴⁴ A bill that would change the definition of the pensionable salary to just the last year's salary is currently before Parliament. Such a change would reduce the effects of inflation on starting pensions, but could also lead to gaming of the system if teachers can push labour earnings into the last year of their career (say through the deferral of some forms of compensation).

⁴⁵ The rate at which additional years of service increased the annual pension had been 2% until recently. The higher rate will be effective retroactively to June 1996, meaning that all pensions paid over the last six years will need to be recalculated, and any increase paid.

⁴⁶ An additional attraction of this loan is that it is only repayable while the person remains alive.

Teachers are allowed to retire any time after reaching 55 years of age.⁴⁷ There is no explicit penalty for early retirement, except for the fact that an early retiree does not accumulate as many months of service with which to increase her pension. Similarly, teachers can continue working after age 60, but they receive no credit for months of service performed after their 60th birthday.

The Implications of Salary Structure Reform for Pension Liabilities

Because pension benefits are a function of wages earned in the last few years of service, the direct impact of changing the structure of teacher pay comes through changes in salaries paid near the end of teachers' careers. Thus, if steeper increases in salaries are implemented as a mechanism for improving incentives, without decreasing salaries of starting and mid-career teachers, pension liabilities will increase significantly. Indeed, even if the structure of salaries over a teacher's lifetime were to be changed while keeping the total value of wages constant, pension liabilities would increase. Similarly, simply expanding the number of higher-level posts (for example, increasing the proportion of senior teachers) would increase pension liabilities.

An indirect pension effect of the reform of the structure of salaries could derive from the intended impact on teacher performance. If altering the pay structure induces teachers to remain longer in the profession, then it is feasible that a higher proportion of them will reach the minimum retirement age before quitting, and that for such individuals the average length of eligible service will increase. The second effect means that the value of the average pension increases, and coupled with the first effect (more pensioners), total pension expenditures rise. This would be the case *even if the pensionable wage did not change*.

Calculating the Impact of Changes in the Structure of Salaries on Pension Expenditures

To estimate the effect of changes in the wage structure on pension liabilities, it is necessary to understand the composition of the retiring population by post and experience. In this section we describe a series of calculations that can shed light on this issue.

To simplify the exposition here, suppose there are just four posts: principal (level 1), vice-principal, and master teacher (level 2),⁴⁸ senior teacher (level 3), and classroom teacher (level 4). The pension paid to an individual j retiring from post i is

$$P_{ji} = \alpha e_{ji} w_{ji}$$

⁴⁷ Teachers are in fact permitted to retire before the age of 55, but can only receive a pension (based on the standard formula) after they turn 55.

⁴⁸ That is, vice-principals and master teachers are treated as being of the same rank.

where $\alpha = 1-540$, e_{ji} is the person's experience (i.e., years of service) in the teaching profession, and w_{ji} is her pensionable wage.

Let r_i be the number of retirees from post i in a given year. The average pension paid to new retirees from level i is

$$P_i = \alpha [\sum_j e_{ji} w_{ji}] - r_i$$

Let us assume that within a post, the covariance between wages and experience of those retiring is zero. This is a strong assumption, but allows us to write

$$\begin{aligned} P_i &= \alpha ([\sum_j e_{ji}] - r_i \times [\sum_j w_{ji}] - r_i) \\ &= \alpha e_i w_i \end{aligned}$$

where e_i is the average experience of retirees from post i , and w_i is their average pensionable wage. The pension bill for all new retirees is thus

$$P^{\text{Total}} = \sum_i r_i P_i$$

and the average pension per new retiree is

$$P = P^{\text{Total}} - R$$

where $R = \sum_i r_i$ is the flow of new retirees.

As we are interested in the impact of changes in the wage structure on pension expenditures, it is useful to calculate the change in pension associated with a given change in wage. Thus let Δw_i be the change in the average pensionable wage for retirees from post i due to a change in the wage structure. The change in the average pension paid to new retirees from post i is then simply

$$\Delta P_i = \alpha e_i \Delta w_i ,$$

the change in the total pension bill for all retirees is $\Delta P^{\text{Total}} = \sum_i r_i \Delta P_i$, and the change in the average pension per new retiree is $\Delta P = \Delta P^{\text{Total}} - R$.

The number of retirees from each post is likely to depend on the number of employees at each level and the rate at which they are promoted. Let n_i be the number of teachers in post i , and let ρ_i be the proportion of those individuals in post i who are not promoted who retire. Then for principals we have $r_1 = \rho_1 n_1$. Assuming that the number of principals remains constant, and that individuals can only be promoted one post at a time, this means that r_1 vice-principals need to be promoted. This leaves a total of $(n_2 - r_1)$ vice-principals who do not receive a promotion to principal. Of these, $\rho_2 (n_2 - r_1) = r_2$ retire. Thus, of the original n_2 vice-principals, r_1 have been promoted and r_2 have retired, leaving $r_1 + r_2$ teachers from rank 3 (senior teachers) to be promoted to vice-principal. The number of senior teachers who retire is then $r_3 = \rho_3 (n_3 - (r_1 + r_2))$, requiring the promotion of $r_1 + r_2 + r_3$ classroom teachers to the post of senior teacher. Finally, $r_4 = \rho_4 (n_4 - (r_1 + r_2 + r_3))$ Classroom teachers retire, requiring the recruitment of $r_1 + r_2 + r_3 + r_4$ new teachers at the junior level.

This logic allows us to recursively estimate the number of retirees from each post, taking into account the fact that retirements at more senior levels induce promotions from more junior levels. However, to implement this calculation we need to estimate the proportion of nonpromoted individuals in each post who retire — that is, the ρ s. There are many factors that influence retirement decisions, but surely the most significant is age itself. We therefore make the simplest assumption possible, that

$$\rho_i = (\# \text{ individuals aged over 55 in post } i) - (\text{total number of individuals in post } i)$$

This rough approximation could be calibrated more closely by using detailed data that might be available through the pension system. However, it is not clear at this moment that information on retirees' ages and post at retirement are easily obtained.

The impact of any change in the wage structure on pension expenditures will likely affect only new retirees. This means that the net budgetary impact of the change, through the pension system, will be phased in over time, as pensioners who retired before the change in wage structure exit the system (i.e., die), and are replaced by those who retire after the change.

To formalize this phase in, let us denote by t the number of years since the change in wage structure. Also, let λ_s be the proportion of individuals who retire in a given year who are alive after s years.⁴⁹ Then assuming no inflation, the pension bill in year t will be

$$P^t = P^{\text{Total}}(\lambda_1 + \lambda_2 + \dots + \lambda_t).$$

⁴⁹ If all retiring individuals retired at the same age (e.g., 60), the λ parameters could be estimated on the basis of standard life tables. In practice such estimates are likely to be reasonably accurate as long as most individuals retire at or near the same age. Due to the rules governing the time at which a pension can be drawn and the impact of years of service on benefit levels, it is reasonable to assume that most individuals retire at around the same age.

Finally, if the maximum number of years a retired person can live is S , then the steady state pension bill is

$$\begin{aligned} P^{\text{steady-state}} &= P^{\text{Total}}(\lambda_1 + \lambda_2 + \dots + \lambda_S) \\ &= P^{\text{Total}} \Lambda, \end{aligned}$$

where $\Lambda = \lambda_1 + \lambda_2 + \dots + \lambda_S$.

Simulations

In the absence of detailed information on the structure of the retiree population and the wages earned by retirees just prior to retirement, simulations of the impact of structural changes to wage and promotion policies must rely on realistic assumptions about these variables. We start by estimating baseline pensions by post, and aggregate across posts and retirees to find the annual cost of pensions paid to newly retired individuals. Policy experiments — including changes in the wage structure and/or the mix of posts — can then be performed. Finally, the effects of these policy changes on total pension expenditures can be tracked through time as the impact is phased in.

Baseline Case

We define two classes of teachers below the rank of principal and vice-principal — namely senior teachers and classroom teachers (including trained teachers, pretrained teachers, and specialists). Table 13 reports data from the MOEYC on the structure of the teacher labour force according to this breakdown, both at the aggregate level and for individuals of age 60.

| Table 13: Structure of Teaching Workforce | | | | |
|--|-------------------|------------------------|------------------------|---------------------------|
| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers |
| Number of teachers | 922 | 622 | 3690 | 17253 |
| Share of teachers by post | 4.10% | 2.77% | 16.41% | 76.72% |
| Number of teachers aged 60 | 30 | 18 | 25 | 27 |
| Pensionable salary (w) | J\$932,868 | J\$736,992 | J\$538,719 | J\$401,981 |
| Retirement rate (ρ) | 16.27% | 14.47% | 3.39% | 0.78% |
| Eligible years of service (e) | 40 | 30 | 20 | 10 |

Sources: Jamaica Education Statistics, 1998-99, Table 2-2; MoEYC statistics; author's calculations.

To estimate the pensionable wage by post, we take simple averages across the relevant teacher pay scales. This is likely to yield an underestimate of the implied pension liabilities, as retiring individuals are more likely to be at the top of each range. The averages for principals and vice-principals are directly available from the wage scales. To estimate the average pensionable salary of senior teachers, we assume that STs must have some kind of training — either teacher training or a university degree. We calculate the average salary across these positions (again, from the salary scales), and add to this the salary increment available to senior teachers.⁵⁰ Finally, to calculate the average pensionable salary of classroom teachers, we take the average of trained teachers who are not senior teachers, and pretrained teachers. Estimated pensionable salaries are reported in the fourth row of Table 13.⁵¹

The number of retiring principals is assumed to be five times the ratio of the number of 60-year-old principals to the total number of principals. This ad hoc assumption recognizes that teachers can retire before or after the age of 60, but that the eligibility rules, as discussed above, tend to favour retirement within the 55-60 age bracket. For each of the other posts, we assume that the rate at which *nonpromoted* individuals retire is similarly equal to 5 times the ratio of the number of 60-year-olds in that post to the total number of teachers in that post. These retirement rates are shown in the fifth row of Table 13. Finally, we assume suggestive values for eligible years of service by post, as reported in the last row of the table.⁵²

With these assumptions, we calculate the value of pensions paid to new retirees. The steady state values are calculated on the assumption that retirees live at most 15 years after retirement, and that the number of new retirees alive s later is

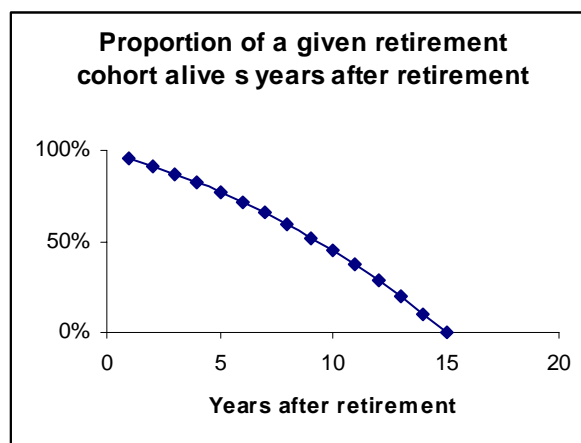
$$n(s) = 1 - [(e^{s-15} - 1) - (e - 1)].$$

The implied values of λ , which describe the evolution of a given retirement cohort, range from 0.96 to 0 (with $\Lambda = \Sigma \lambda_s = 2.88$), and are exhibited in Figure 14.

⁵⁰ There are currently three classes of senior teachers – ST1, ST2, and ST3. ST1s receive an increment equal to 10% of the minimum Trained Teacher Diploma Scale (equal to J\$40,698), while ST2s and ST3s receive 15% (J\$61,047) and 20% (J\$81,395) respectively. All STs receive in addition a transport allowance of J\$26,340, which we assume is included in the pensionable salary. The average ST increment is thus J\$87,387.

⁵¹ As a check, these calculations imply a total wage bill for teaching staff of about J\$10,200 million. Data from the MOEYC on actual expenditures in 2001-02 show total teacher compensation of about J\$11,200 million. Our simulations thus can hopefully be expected to be roughly accurate.

⁵² These assumptions have been called into question during discussion of this report, when it was felt that the estimated number of retiring principals was too high. The results that follow would be altered if principals represented a lower share of the annual retiring population of teachers — in particular, pay increases for principals would have a smaller impact on aggregate pension liabilities. The qualitative features of the results would, however, be maintained.

Figure 14: Evolution of Retiring Cohort over Time

The results of these calculations are presented in Table 14. The first row of the table reports the estimated number of retiring individuals in a given cohort (i.e., year), and the second converts these to percentages. Under our assumptions, about a third of a cohort of retirees are principals, about half are senior teachers or classroom teachers, and the rest (15%) are vice-principals. It would be useful to check these estimates against data on retirement from the teaching profession, but such data has been difficult to obtain.

The third row of the table shows average pensions per person by post, and across all retiring teachers. Our estimates suggest an average pension (for a new retiree) of about J\$35,000. Again, for the purposes of calibration it would be useful to compare this with the actual average pension paid to retiring teachers. The fourth row reports the total pension bill (by post, and across all posts) for a cohort of new retirees, and the fifth shows estimates of total pension expenditures that would arise in steady state — that is, under the assumption that the pension rules have been in place long enough (15 years, by assumption) that they cover all existing retired persons. Finally, the fifth row calculates the share of pension expenditures (in steady state) that go to retirees from each post. Thus 63% of pension expenditures on retired teachers goes to retired principals and just 6% goes to retired classroom teachers.

Table 14: Baseline Estimates of Pensions and Pension Bills

| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers | All Teachers |
|---------------------------|-------------------|------------------------|------------------------|---------------------------|---------------------|
| Number retiring | 150 | 68 | 118 | 132 | 468 |
| Share of retiring cohort | 32% | 15% | 25% | 28% | 100% |
| Average pension | \$69,101 | \$40,944 | \$19,953 | \$7,444 | \$35,222 |
| Total cohort pension bill | \$10,365,196 | \$2,796,303 | \$2,346,525 | \$985,388 | \$16,493,412 |
| Steady state pension bill | \$85,244,361 | \$22,997,062 | \$19,298,046 | \$8,103,924 | \$135,643,393 |
| Share | 63% | 17% | 14% | 6% | 100% |

Policy Experiments

We next perform three indicative policy experiments. In the first, average wages of principals and vice-principals are increased by 10 percent and 5 percent respectively, while those of senior teachers and classroom teachers are left unchanged. In the second, wages of senior teachers are increased on average by 20 percent, while those of classroom teachers are reduced by enough (about 6 percent) to keep the current wage bill fixed.⁵³ In the third simulation, wages are held constant while the number of senior teacher positions is increased by 20 percent, and the number of classroom teachers is reduced (by about 4.3 percent) so as to keep the total number of teaching staff constant. Finally, in the fourth simulation, the first and third reforms are implemented simultaneously — senior management personnel get a raise, while the mix of senior and classroom teachers is altered as in the third reform.

The results of these simulations are reported in Tables 15 through 18. Each table reports the same financial information as in the baseline case (average pensions, total cohort pension bill, and the steady state pension bill), as well as changes over the baseline case for the latter two values.

⁵³ This could be implemented by paying university graduates more, and trained teachers less.

Table 15: Reform I - Wage Increases for Managerial Staff

| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers | All Teachers |
|---|-------------------|------------------------|------------------------|---------------------------|---------------------|
| Average pension | \$76,011 | \$42,991 | \$19,953 | \$7,444 | \$37,734 |
| Total cohort pension bill | \$11,401,716 | \$2,936,118 | \$2,346,525 | \$985,388 | \$17,669,747 |
| Change in cohort cost over baseline | \$1,036,520 | \$139,815 | \$0 | \$0 | \$1,176,335 |
| Steady state pension bill | \$93,768,797 | \$24,146,915 | \$19,298,046 | \$8,103,924 | \$145,317,683 |
| Change in steady state cost over baseline | \$8,524,436 | \$1,149,853 | \$0 | \$0 | \$9,674,289 |
| Percentage change | 10.0% | 5.0% | 0.0% | 0.0% | 7.1% |

Note: Figures are in Jamaican dollars.

Table 16: Reform II — 20 Percent Increase in Senior Teacher Pay

| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers | All Teachers |
|---|-------------------|------------------------|------------------------|---------------------------|---------------------|
| Average pension | \$69,101 | \$40,944 | \$23,943 | \$7,017 | \$36,103 |
| Total cohort pension bill | \$10,365,196 | \$2,796,303 | \$2,815,830 | \$928,900 | \$16,906,229 |
| Change in cohort cost over baseline | \$0 | \$0 | \$469,305 | -\$56,488 | \$412,817 |
| Steady state pension bill | \$85,244,361 | \$22,997,062 | \$23,157,655 | \$7,639,362 | \$139,038,440 |
| Change in steady state cost over baseline | \$0 | \$0 | \$3,859,609 | -\$464,562 | \$3,395,047 |
| Percentage change | 0.0% | 0.0% | 20.0% | -5.7% | 2.5% |

Note: Figures are in Jamaican dollars.

Table 17: Reform III — 20 Percent Increase in Number of Senior Teachers

| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers | All Teachers |
|---|-------------------|------------------------|------------------------|---------------------------|---------------------|
| Average pension | \$69,101 | \$40,944 | \$19,953 | \$7,444 | \$34,779 |
| Total cohort pension bill | \$10,365,196 | \$2,796,303 | \$2,845,339 | \$940,945 | \$16,947,783 |
| Change in cohort cost over baseline | \$0 | \$0 | \$498,814 | -\$44,443 | \$454,371 |
| Steady state pension bill | \$85,244,361 | \$22,997,062 | \$23,400,342 | \$7,738,419 | \$139,380,184 |
| Change in steady state cost over baseline | \$0 | \$0 | \$4,102,296 | -\$365,506 | \$3,736,790 |
| Percentage change | 0.0% | 0.0% | 21.3% | -4.5% | 2.8% |

Note: Figures are in Jamaican dollars.

| | Principals | Vice-Principals | Senior Teachers | Classroom Teachers | All Teachers |
|---|-------------------|------------------------|------------------------|---------------------------|---------------------|
| Average pension | \$76,011 | \$42,991 | \$19,953 | \$7,444 | \$37,193 |
| Total cohort pension bill | \$11,401,716 | \$2,936,118 | \$2,845,339 | \$940,945 | \$18,124,118 |
| Change in cohort cost over baseline | \$1,036,520 | \$139,815 | \$498,814 | -\$44,443 | \$1,630,706 |
| Steady state pension bill | \$93,768,797 | \$24,146,915 | \$23,400,342 | \$7,738,419 | \$149,054,473 |
| Change in steady state cost over baseline | \$8,524,436 | \$1,149,853 | \$4,102,296 | -\$365,506 | \$13,411,080 |
| Percentage change | 10.0% | 5.0% | 21.3% | -4.5% | 9.9% |

Note: Figures are in Jamaican dollars.

The bottom line of these simulations is that changes in wage structure — in particular in the relative wages of different posts and their relative sizes — will impact pension liabilities in a predictable way. Because pensions are proportional to wages near the time of retirement, a wage increase for members of a given post raises pensions by the same proportion *for the group of individuals retiring at that post*. The proportional impact of this change on aggregate pension expenditures (at the cohort level, and in steady state) depends then on the share of pension expenditures made on behalf of each post (the bottom row of Table 14).

Indeed, Tables 15 through 18 can be summarized simply by noting that a wage change of $x_i\%$ for post i , increases pension liabilities payable to retirees of that post by $\sigma_i \times x_i\%$, and the aggregate proportional effect (the bottom right hand cell in Tables 15 and 16) is just $\sum_i (\sigma_i \times x_i)\%$. Thus wage increases for principals have a large effect on pension liabilities because a large fraction of retirees are principals (compared with the fraction of principals in the population of teaching personnel — see row 2 of Table 13).

Changing the number of employees in a given post (e.g., as in reform III) has similar effects. For example larger number of senior teachers naturally increases the number of teachers who retire while in this post. However, assuming the number of (and rate of retirement of) employees at higher-level posts remains unchanged, the number of retiring senior teachers increases by slightly more than the proportionate increase in the number employed. Thus in Table 17 steady state pensions paid to retired senior teachers are 21.4% higher (the last row) due to the 20% increase in the number of senior teachers.

While steady state pensions paid to senior teachers increase proportionately (either exactly, or approximately, depending on the reform) with the wage bill, the impact on aggregate steady state pensions is small — about 2.5 percent. This is again because senior teachers' pensions are lower than retiring principals' and vice-principals', and because they make up (by our estimations) just 25% of the retiring pool.

6. Recommendations and Conclusions

On the basis of the foregoing analysis, it is suggested that the government consider the following reforms of the teacher pay scales.

- (i) Simplify the structure of recognized qualifications to include simply three classes:
 - a. high school graduates,
 - b. trained teachers (either diploma or certificate trained, or holders of specific specialist skills), and
 - c. university graduates.

Further refinement of these grades is possible, particularly for university graduates, so as to distinguish between math-science graduates and others.

- (ii) Retain the premium paid to trained teachers over high school graduates. Increase the salary increment paid to untrained university graduates to around 80%, and reduce the salary increment earned by university graduates who acquire teacher training to around 15%. In particular, the marginal reward for completing university (in terms of teaching salary increment) should be larger than the marginal reward for completing teacher training. If it is considered desirable to induce more university graduates to undertake teacher training, the cost of such training (including forgone salary) could be subsidized (in part or in full).
- (iii) Define three jobs titles for teaching staff — classroom teacher, senior teacher, and master teacher. Promotion from one post to the next may require the attainment of certain qualifications, but is not guaranteed by such.
 - a. Classroom teachers must have be high school graduates, and are paid on the basis of their qualifications (see (ii) above);
 - b. Senior teachers must be at least trained teachers, and are paid a fixed proportionate premium over their qualification-based salary;
 - c. Master teachers must have a university degree, and are paid a proportional premium above the base salary for university graduate senior teachers.
- (iv) Increase the number of senior teachers and speed up the process of appointing master teachers. Senior teachers should be paid a percentage bonus above their qualification-determined salary.
- (v) Rationalize the grades of primary and secondary schools for the purposes of defining principal posts.

The simulations presented in the report confirm that changing the pay scales will necessarily impact pension liabilities. These simulations have had to rely on a number of assumptions about the makeup of the retiring population (e.g., by age and post), as well as retirees' wages and experience. In particular, it has been assumed that about 32% of retirees are principals and that about 63% of teacher pension costs go to paying principals' pensions.

Under the maintained assumptions, it is found that changes to the wages and employment levels of senior teachers and classroom teachers will have relatively small effects on total pension expenditures on individuals retiring from the teaching profession. Thus a 20% increase in the wage at retirement for senior teachers will have a proportionate impact on retiring senior teachers' pensions, but only about a 2.8 percent impact on total pension spending.

Similarly, any reduction in wages of lower-level teaching staff will have a limited effect on aggregate pensions. In the simulations of reform II, a 5.7 percent reduction in the wage at retirement of classroom teachers leads to only a 0.3 percent reduction in aggregate pensions (because classroom teachers represent a small share of retiring individuals, and their pensions are already relatively small).