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Economics of Education (EENEE)**

**Analysis of incentives
to raise the quality of instruction**

EENEE Analytical Report No. 26
Prepared for the European Commission

Daniel Münich and Steven Rivkin
December 2015

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Analysis of incentives to raise the quality of instruction

EENEE Analytical Report¹

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EXECUTIVE SUMMARY (ENGLISH)

A (European Commission, 2013) report highlighted the growing consensus that raising teacher quality is key to improving the quality of education. This recognition precipitated efforts to establish compensation, evaluation, incentive and support systems to ensure that effective teachers are prepared, recruited, retained, and motivated.

This report, building on (OECD, 2009b), considers the evidence on a range of monetary and non-monetary incentives related to the quality of instruction. These include factors at all points in the processes that determine the quality of instruction: 1) entry into the teaching profession; 2) the quality of initial teacher education (ITE); 3) the effectiveness of continuing professional development (CPD); the decision to remain in teaching; and the effectiveness of human resource practices. Although monetary incentives related to performance have received much emphasis lately, the potentially important role of other extrinsic incentives as well as intrinsic (internal) incentives must not be neglected. The latter are thought to be closely connected with educational success and rewarding interactions with students, and evidence discussed below suggests that these are particularly important for teachers in schools serving disadvantaged children.

The aforementioned and other reports highlight the existence of many interrelated channels through which incentives may operate. Consider the effects of the increase in the labour market return to secondary and tertiary education and skill experienced in recent decades. This elevates the incentives for children and their families to complete secondary and tertiary schooling and to demand and seek out a higher quality education. This in turn may place pressure on policy makers and administrators to elevate the quality of instruction. Based on the evidence presented below, potential changes in policies and practices include the hiring of more effective school leaders and teachers, the introduction of a closer link between compensation and performance, the thoughtful expansion of alternative certification routes into teaching, more rigorous evaluation used in teacher development and personnel decisions, and the use of more effective CPD programmes. This in turn may provide teachers with a stronger incentive to seek out more effective ITE programmes and consequently elevate pressure on those programmes to improve.

Although conceptually appealing, evidence does not support the belief that that higher labour market return to schooling has led to broad improvements in the quality of instruction through the channels described in the previous paragraph. The lack of school choice in many public school systems might contribute to the weakness of such incentives. However, there is little compelling evidence that expanded choice transforms the practices that determine the quality of instruction. Moreover, concerns that choice may serve disadvantaged children poorly, compromise important educational objectives, and not lead to substantial improvement in the quality of instruction suggests that the public provision of schooling will remain the dominant structure in elementary and secondary education. Therefore strengthened

and expanded incentives within the current schooling structure likely constitute the primary channels through which the quality of instruction could be raised.

The report considers research on ITE programmes, schools and teachers in EU Member States and other countries. However, the bulk of richer and more reliable evidence, particularly that based on randomized controlled trials or other research designs that provide more compelling estimates of causal effects, still come more from the US and developing countries. This results in part from the wider use of monetary incentives in settings outside of the EU. But potential variation in incentive effects by institutional structure and other factors makes raise concerns that the lack of evidence and efforts to obtain it in many Member States may hinder the development of effective educational policies in the EU.

Key findings

Perhaps the primary findings concerns the failure of the current education structure in many countries to provide the regulations and incentives necessary for teachers to seek out the most effective ITE programmes, for schools to adopt the most effective CPD programmes, and for schools to attract, develop, motivate and retain the most effective teachers. Evidence on the benefits of specific incentive programmes including pay for performance schemes directed toward individual teachers, groups of teachers, or schools reveals some successes but also suggests that proper environment and programmatic details matter a great deal. Similarly, research on evaluation and feedback strongly suggests that the quality of instruction improves following an evaluation, though this finding is based on quite limited evidence. Evidence on the benefits of expanded school choice and competition is mixed and not the focus of this study, but it would be valuable to gain a clearer understanding of the strength of competitive pressures felt by schools under different choice structures and the degree to which those pressures translate into higher quality instruction. Similarly, the substantial variation in the quality of instruction among teachers with similar backgrounds in combination with the apparent benefits of meaningful feedback suggests that the quality of human resource practices is an important component of any effort to raise the effectiveness of instruction.

The conclusions related to ITE programmes are based on the following evidence: (i) there is little or no systematic empirical evidence that teachers with master's degree outperform those without; (2) randomized controlled trials show that high-achieving college graduates who do not attend ITE programmes but rather take an alternative route to teaching are more effective mathematics teachers in a high-poverty setting than those who complete a traditional ITE programme; and (3) there is little evidence of systematic differences in ITE programme quality as measured by future effectiveness in the classroom. These findings raise important questions about the desirability of restrictions on teacher preparation including policies that require the completion of extensive coursework in subjects that have little benefit outside of teaching and may have little impact on the quality of instruction.

The conclusions related to CPD programmes comes largely from randomized controlled trials in the US that show little effect of intensive CPD programmes on teacher knowledge or effectiveness despite the fact that these programmes reflect best practices. Given the high financial and time cost this raises questions about the structure of teacher supports and calls for much greater attention of policymakers to the monitoring of CPD quality as measured by the contribution to better performance of teachers.

In contrast, there is compelling evidence that teacher evaluation and feedback leads to improvement in teacher effectiveness. Based on a rigorous research design that compares effectiveness in the years prior to, during and following the feedback, the findings highlight the importance of personnel practices as a key input to teacher growth. Key questions remain about the determinants of the quality of evaluations and feedback and the responsiveness of teachers to the information, particularly the potential role of extrinsic incentives for teachers and school leaders.

Finally, a complex relationship exists between the distribution of teacher quality on the one hand and the level and structure of compensation on the other. The historical and still ongoing expansion of labour market opportunities for women and widespread increases in the returns to a tertiary education has placed severe cost pressures on schools. These changes have likely contributed to a decline in the selectivity of entrants into teaching relative to other occupations. Even though intrinsic factors remain among the most if not the most important determinants of entry into teaching, compensation certainly affects career decisions of many prospective teachers.

The fixed salary schedule very likely leads to lower quality of instruction for a given cost. First, subject differences in alternative career opportunities raises questions about the absence of salary differences across subjects. Second, evidence that finds a positive effect of pay for performance on student outcomes suggests that more widespread use of such incentives could elevate the quality of instruction. It should be noted, however, that the fixed salary schedule remains the dominant compensation form and that additional evidence on longer-term use of alternative structures would be quite valuable. Third, the general absence of compensation differences by working conditions including poverty level almost certainly exacerbates differences in the quality of instruction by family income.

Taken as a whole, scientific research suggests a careful consideration of the appropriate roles of incentives and regulation and the importance of the quality of teachers and administrators including school leaders. There may be a number of circumstances in which the relaxation or elimination of regulations and requirements may actually elevate the quality of instruction at a lower cost. In addition, the implications of the fixed salary schedule for 1) the quality of teacher preparation and CPD; 2) the distribution of teacher quality by family income and other demographic factors; and 3) the joint decisions by teachers and administrators that determine entry and continuation in teaching all merit careful review.

EXECUTIVE SUMMARY (GERMAN)

Ein Bericht (der Europäischen Kommission, 2013) betonte den wachsenden Konsens, dass das Anheben der Lehrerqualität zentral für eine Verbesserung der Bildungsqualität ist. Diese Feststellung hat Bemühungen ausgelöst, angemessene Kompensations-, Bewertungs-, Anreiz- und Unterstützungssysteme zu schaffen, um effektive Lehrer anzulernen, anzustellen, zu behalten und zu motivieren.

Dieser Bericht, der sich auf den (OECD, 2009) Bericht stützt, berücksichtigt Evidenz zu monetären und nicht-monetären Anreizen, die mit der Unterrichtsqualität in Zusammenhang stehen. Diese Anreize beinhalten Faktoren zu jedem Zeitpunkt des Prozesses, zu dem Unterrichtsqualität bestimmt wird: 1) Eintritt in den Lehrerberuf; 2) Qualität anfänglicher Lehrerbildung (ITE); 3) Effektivität von Lehrerweiterbildung (CPD); 3) Entscheidung, Lehrer zu bleiben; und 4) Effektivität von Personalarbeit. Obwohl monetäre Anreize in letzter Zeit viel Aufmerksamkeit erfahren haben, darf die möglicherweise wichtige Rolle von anderen extrinsischen Anreizen genauso wie von intrinsischen (internen) Anreizen nicht vernachlässigt werden. Für die Letzteren wird angenommen, dass sie eng mit dem Bildungserfolg verbunden sind und damit, Interaktionen mit Schülern zu belohnen. Die unten diskutierte Evidenz lässt vermuten, dass diese Anreize für Lehrer an Schulen mit benachteiligten Kindern besonders wichtig sind.

Der oben erwähnte Bericht, sowie andere Berichte, betonen die Existenz von vielen mit einander verbundenen Kanälen, durch die die Anreize wirken können. Die Arbeitsmarkterträge für sekundäre und tertiäre Bildung und Kompetenzen sind in den letzten Jahrzehnten gestiegen. Das erhöht die Anreize für Kinder und ihre Familien, die sekundäre oder tertiäre Schule abzuschließen und eine höhere Qualitätsbildung zu fordern und zu suchen. Das kann wiederum die politischen Entscheidungsträger und die Behörden dazu anhalten, die Unterrichtsqualität zu erhöhen. Basierend auf der unten vorgestellten Evidenz, könnten das Einstellen von effektiveren Schulleitern und Lehrern, die Einführung einer engeren Verbindung zwischen Vergütung und Leistung, die durchdachte Ausweitung von alternativen Zertifizierungswegen in das Unterrichten, eine gründlichere Bewertung als Basis für die Lehrerentwicklung und Personalentscheidungen, und die Benutzung von effektiveren CPD Programmen als mögliche Veränderungen in Bezug auf Politikmaßnahmen und Praktiken betrachtet werden. Das könnte Lehrern wiederum stärkere Anreize geben, effektivere ITE Programme zu suchen und schließlich Druck auf diese Programme ausüben, die Qualität zu verbessern.

Obwohl es konzeptionell attraktiv scheint, bestätigt die empirische Evidenz nicht, dass höhere Arbeitsmarkterträge durch die im obigen Paragraphen beschriebenen Kanäle zu weitreichenden Verbesserungen in der Unterrichtsqualität geführt haben. Dass Schulen in vielen öffentlichen Schulsystemen nicht frei gewählt werden können, könnte ein Grund dafür sein, dass die Anreize keine Wirkung entfalten. Tatsächlich gibt es wenig überzeugende empirische Evidenz, dass eine Ausweitung der Wahlentscheidungen die Praktiken, die Unterrichtsqualität bestimmen, umwandeln

kann. Außerdem lassen Bedenken, dass eine freie Schulauswahl benachteiligen Kindern wenig dienen, wichtige Bildungsziele beeinträchtigen und nicht zu substantiellen Verbesserungen in der Unterrichtsqualität führen würde, vermuten, dass die öffentliche Bereitstellung der Schule die dominante Struktur für Primär- und Sekundarbildung bleiben wird. Deswegen stellen gestärkte und ausgeweitete Anreize innerhalb der jetzigen Schulstruktur die primären Kanäle, durch die die Unterrichtsqualität angehoben werden kann.

Der Bericht berücksichtigt Forschung zu ITE Programmen, Schulen und Lehrern in EU Mitgliedstaaten und in anderen Ländern. Allerdings kommt der Großteil der gehaltreichen und verlässlicheren empirischen Evidenz, besonders solche, die sich auf randomisierte kontrollierte Studien oder andere Forschungsdesigns stützt, welche überzeugendere Schätzer zu kausalen Effekten liefern, aus den USA und Entwicklungsländern. Das resultiert zum Teil aus der breiteren Nutzung von monetären Anreizen außerhalb der EU. Aber eine mögliche Variation in Anzeizeffekten, welche durch Unterschiede in der institutionellen Struktur und andere Faktoren bedingt werden, lassen Bedenken aufkommen, dass die fehlende empirische Evidenz und die fehlenden Bemühungen, eine solche in EU-Mitgliedstaaten zu generieren, die Entwicklung von effektiven bildungspolitischen Maßnahmen in der EU verhindern wird.

Schlüsselergebnisse

Die Hauptergebnisse betreffen wohl das Versagen der gegenwärtigen Bildungsstrukturen, in vielen Ländern Regulierungen und die nötigen Anreize für Lehrer zu schaffen, so dass diese die effektivsten ITE Programme auswählen, Schulen die effektivsten CPD Programme anwenden und gleichzeitig die effektivsten Lehrer anwerben, ihre Fähigkeiten weiterentwickeln und sie motivieren und sie schließlich als Lehrer beibehalten können. Empirische Evidenz über den Nutzen spezifischer Anreizprogramme, welche eine Bezahlung nach Leistung für einzelne Lehrer, Lehrergruppen oder Schulen beinhalten können, zeigen einigen Erfolg, lassen aber auch vermuten, dass das richtige Umfeld und programmatische Details eine wichtige Rolle spielen. Genauso suggeriert Forschung zu Evaluation und Feedback in einem starken Maß, dass die Unterrichtsqualität sich nach einer Evaluation verbessert. Allerdings basiert dieses Resultat auf begrenzter empirischer Evidenz. Genauso deuten die erheblichen Unterschiede in der Unterrichtsqualität von Lehrern mit ähnlichem Hintergrund in Verbindung mit offensichtlichen Zuschüssen als Folge von aussagekräftigem Feedback darauf hin, dass die Qualität von Personalarbeit eine wichtige Komponente dabei spielt, die Effektivität von Unterricht zu erhöhen.

Die Schlussfolgerungen zu ITE Programmen basieren auf der folgenden empirischen Evidenz: (1) es gibt keine systematische empirische Evidenz dazu, dass Lehrer mit einem Masterabschluss solche ohne Masterabschluss übertreffen; (2) randomisierte kontrollierte Studien zeigen, dass sehr gute College Absolventen, die kein ITE Programm absolviert haben und einen alternativen Weg zum Lehrerberuf gewählt haben, in einer Umgebung mit hoher Armut, effektivere Mathematiklehrer sind als

solche, die ein klassisches ITE Programm abgeschlossen haben; und (3) gemessen an der zukünftigen Effektivität im Klassenzimmer gibt es geringe Evidenz, dass sich die Programmqualität von ITEs systematisch unterscheidet. Diese Ergebnisse werfen wichtige Fragen darüber auf, wie wünschenswert die Zugangsbeschränkungen zur Lehrervorbereitung sind. Das beinhaltet politische Maßnahmen, die das Abschließen eines umfangreichen Kursprogramms in solchen Fächern voraussetzt, die außerhalb der Schule wenig Nutzen stiften und gleichzeitig wenig Einfluss auf die Unterrichtsqualität haben.

Die Schlussfolgerungen in Bezug auf CPD Programme gehen zum größten Teil auf randomisierte kontrollierte Studien in den USA zurück, welche einen geringen Effekt von intensiven CPD Programmen auf Lehrerwissen und –effektivität zeigen, obwohl diese Programme als *best practice* gelten. Angesichts der hohen finanziellen und zeitlichen Kosten wirft das Fragen über die Struktur der Lehrerweiterbildung auf und fordert, dass die Aufmerksamkeit politischer Entscheider auf die Qualität von CPD gelenkt wird, gemessen an Hand des Beitrags zu einer besseren Lehrerleistung.

Im Gegensatz dazu, gibt es überzeugende empirische Evidenz, dass die Lehrerevaluierung und das Feedback zu einer Verbesserung der Lehrereffektivität führen. Ergebnisse, die auf einem gründlichen Forschungsdesign basieren, das die Effektivität in den Jahren, vor, während und nach des Feedbacks vergleichen, betonen die Wichtigkeit von Personalarbeit als einen wichtigen Beitrag zur Lehrerentwicklung. Zentrale Fragen über die Bestimmungsgrößen der Qualität von Evaluationen und Feedback und die Bereitschaft von Lehrern auf solche Information zu reagieren und im Besonderen die mögliche Rolle von extrinsischen Anreizen für Lehrer und Schuldirektoren bleiben offen.

Schließlich besteht ein komplexes Verhältnis zwischen der Verteilung der Lehrerqualität auf der einen Seite und dem Niveau und der Struktur der Kompensation auf der anderen Seite. Die historische und immer noch anhaltende Ausweitung der Arbeitsmarktmöglichkeiten für Frauen und ein weitverbreiteter Anstieg der Erträge für tertiäre Bildung führen zu einem ernsthaften Kostendruck auf die Schulen. Diese Veränderungen haben wahrscheinlich zu einer verminderten Selektivität von Lehramtsanwärtern im Vergleich zu Anwärtern in anderen Berufen geführt. Obwohl intrinsische Faktoren unter den wichtigsten – wenn nicht sogar die wichtigsten – Bestimmungsgrößen für die Entscheidung zu unterrichten, bleiben, beeinflusst die Bezahlung mit Sicherheit die Karriereentscheidung von vielen angehenden Lehrern.

Die festen Gehaltsvorgaben führen wahrscheinlich bei gegebenen Kosten zu einer niedrigeren Unterrichtsqualität. Zu allererst lassen die Gehaltsunterschiede zwischen unterschiedlichen Bereichen alternativer Karrierewege die Frage aufkommen, warum es keine Gehaltsunterschiede zwischen einzelnen Unterrichtsfächern gibt. Zweitens suggerieren empirische Ergebnisse, nach denen eine Bezahlung nach Leistung zu besseren Schülerergebnissen führt, dass eine Ausbreitung solcher Anreize die Unterrichtsqualität steigern könnte. Es sollte angemerkt werden, dass feste

Gehaltsvorgaben die vorherrschende Form der Vergütung bleiben und dass weitere empirische Evidenz zur langfristigen Anwendung von alternativen Strukturen wertvoll wäre. Drittens verschärft der Mangel an Unterschieden in der Vergütung in Bezug auf Arbeitsbedingungen wie dem Armutsniveau die Unterschiede in der Lehrerqualität bei variierendem Familieneinkommen.

Insgesamt legt die wissenschaftliche Forschung eine sorgfältige Betrachtung des angemessenen Rahmens von Anreizen und Regulierung und der Wichtigkeit von Lehrern und administrativem Personal, inklusive Schulleitern nahe. Es kann eine Anzahl an Umständen geben, in denen eine Lockerung oder Aussetzung von Regulierungen und Vorschriften die Unterrichtsqualität bei niedrigeren Kosten anheben könnte. Zusätzlich verdienen alle Implikationen fester Gehaltsvorhaben für 1) die Qualität der Lehrervorbereitung und CPD; 2) die Verteilung von Lehrerqualität nach Familieneinkommen und anderen demographischen Faktoren; und 3) die gemeinsame Entscheidung von Lehrern und Behörden, die den Eintritt und die Weiterführung in das Lehrersein bestimmen, eine sorgfältige Überprüfung.

EXECUTIVE SUMMARY (FRENCH)

Un récent rapport de la Commission Européenne (2013) a montré le consensus qui règne autour du lien entre un personnel enseignant qualifié et motivé et la qualité de l'éducation dispensée. Cette reconnaissance a précipité une série de mesures visant à établir des mécanismes de compensation, d'évaluation, d'incitation et de formation pour s'assurer que les enseignants sont effectivement préparés, recrutés et évalués.

Ce rapport, qui s'appuie sur des travaux antérieurs de l'OCDE (2009b), analyse les implications de mécanismes d'incitation pécuniaires et non-pécuniaires sur la qualité de l'instruction. Ces mécanismes interviennent à tous les points critiques pour la qualité du processus d'éducation : 1) l'entrée dans la profession enseignante ; 2) la qualité de la formation initiale des enseignants ; 3) l'effectivité de la formation professionnelle continue ; la décision de rester dans l'enseignement ; l'attention portée à la gestion des ressources humaines. Bien que les mécanismes d'incitation pécuniaires basés sur la performance aient reçu beaucoup d'attention récemment, le rôle potentiellement important d'autres incitations externes aussi bien qu'internes ne doit pas être négligé. Ces dernières sont considérées comme étant intimement liés avec la réussite scolaire ainsi qu'à des interactions de qualité avec les élèves et, comme le montrent des résultats empiriques discutés plus loin, la relation élève-professeur apparaît cruciale notamment dans les établissements situés dans des zones défavorisées.

Tous les travaux précédemment cités montrent qu'il existe plusieurs canaux entremêlés par lesquels les incitations peuvent opérer. Considérons par exemple l'effet d'un accroissement de la prime à l'éducation supérieure sur le marché du travail – comme c'est le cas depuis plusieurs décennies. Ceci rend l'enseignement supérieur plus attractif pour les enfants et les parents et les encourage à demander et à rechercher une éducation secondaire et supérieure de qualité. Ceci peut en retour créer une pression sur les décideurs politiques et l'administration pour élever la qualité de l'enseignement. Si l'on en croît les études à disposition, des exemples de changement de politique et de pratiques en matière d'éducation incluent : l'embauche de professeurs et de chefs d'établissement plus compétents, la systématisation du lien entre rémunération et performance, un élargissement raisonné de voies alternatives vers la profession d'enseignant, une évaluation plus rigoureuse utilisée par les ressources humaines dans leur gestion du personnel et des programmes de formation continue effectifs. Tout ceci pourrait en retour inciter les professeurs à suivre une formation initiale plus poussée et par conséquent inciter les organismes dispensant cette formation à s'améliorer.

Bien qu'elle soit conceptuellement attrayante, les chiffres semblent ne pas supporter l'idée qu'une prime à l'éducation plus importante ait mené à une amélioration significative de la qualité de l'éducation via les canaux décrits plus haut. Le manque de liberté dans le choix de l'établissement dans beaucoup de systèmes d'éducation publique pourrait contribuer à la faiblesse de telles incitations. Cependant, il n'y a que peu de résultats convaincants montrant que la liberté dans le choix de

l'établissement affecte la qualité de l'enseignement. De plus, un tel mécanisme peut handicaper les enfants issus de milieux défavorisés et compromettre d'autres objectifs éducatifs importants. Ainsi, si une telle réforme ne mène pas à des progrès substantiels en termes de qualité de l'enseignement, il semble préférable de conserver les systèmes publics pour l'éducation primaire et secondaire. Des mécanismes d'incitations élargis et approfondis au sein du système actuel constituent donc la voie de réforme à privilégier pour améliorer l'enseignement.

Le rapport fait également état de la recherche concernant les programmes, les écoles et les professeurs concourant à la formation initiale au métier d'enseignant dans les Etats membres de l'UE et dans d'autres pays. Néanmoins, la majeure partie des résultats empiriques solides, en particuliers ceux basés sur des essais randomisés et d'autres méthodes permettant l'isolation de l'effet causal, proviennent des Etats-Unis et des pays en développement. Ceci est en partie dû à l'utilisation plus intensive qui est faite des incitations pécuniaires en dehors de l'Union Européenne. Les variations potentielles dans les effets des mécanismes d'incitations du fait de la structure institutionnelle et d'autres facteurs ne sont cependant pas sans soulever la question de leur généralisation. Ainsi, le manque de résultats chiffrés pour l'UE et le peu d'efforts consentis pour en obtenir pourraient empêcher la mise en place de politiques éducatives efficaces en Europe.

Principaux résultats

Les résultats principaux sont sans doute ceux qui mettent en lumière l'échec des structures éducatives actuelles dans plusieurs pays à inciter d'une part les enseignants à rechercher la meilleure formation initiale et d'autre part les écoles à mettre en place des programmes de formation continue efficaces ainsi qu'à attirer, former, motiver et retenir les meilleurs professeurs. Les résultats concernant des mécanismes d'incitation spécifiques comme la prise en compte dans la rémunération de la performance de l'enseignant, ou d'un groupe d'enseignants, ou même de l'école toute entière révèlent un certain succès mais montrent également la nécessité d'un environnement adapté et ainsi que l'importance des détails du mécanisme. De la même manière, les études concernant l'évaluation et les feedbacks démontrent que l'instruction s'améliore après une évaluation, bien que ce résultat soit limité par la méthode adoptée. Les résultats concernant l'élargissement du choix d'établissement et la compétition entre eux sont mitigés et ne sont pas au cœur de cette étude. Il serait toutefois intéressant d'avoir une vision plus claire des pressions compétitives ressenties par les établissements scolaires sous différents systèmes et d'apprécier la mesure dans laquelle cette pression se traduit en une qualité accrue de l'enseignement. Par ailleurs, les variations substantielles de la qualité pédagogique d'enseignants aux parcours pourtant similaires combinées aux bienfaits apparents des mécanismes de feedback suggèrent que la qualité de la gestion du personnel est une composante centrale pour toute réforme visant à améliorer la qualité de l'enseignement.

Les conclusions concernant les programmes de formation initiale des enseignants se basent sur les résultats suivants : 1) les chiffres ne supportent pas l'idée que les enseignants ayant obtenu un master sont plus performants que les autres ; 2) des essais randomisés montrent que les jeunes diplômés du supérieur qui ne suivent pas de formation initiale au métier d'enseignant mais choisissent des parcours alternatifs font de meilleurs professeurs de mathématiques dans les milieux défavorisés que ceux qui ont suivi la voie traditionnelle ; 3) il semble y avoir peu de différence de qualité entre les programmes de formation initiale, telle que mesurée par la performance en classe des enseignants. Ces résultats posent la question du caractère désirable de restrictions dans la formation des enseignants telles que l'obligation pour un aspirant professeur d'obtenir un diplôme dans des matières qui n'auront que peu de vertus pour la qualité de l'enseignement.

En ce qui concerne les programmes de formation continue, la plupart des résultats proviennent d'essais randomisés effectués aux Etats-Unis. Ils montrent que les programmes intensifs ont peu d'impact sur les connaissances et la performance des enseignants malgré le fait qu'ils reflètent les meilleures pratiques du métier. Etant donné le coût élevé en termes de temps et d'investissement financier, ces résultats amènent à remettre en cause l'effectivité des formations dispensées et appellent, de la part des décideurs, à une attention accrue quant à la qualité de ces programmes telle que mesurée par leur contribution à l'amélioration de la performance des enseignants.

A l'inverse, les chiffres montrent que les évaluations et les mécanismes de feedbacks permettent une amélioration substantielle de la qualité de l'enseignement. Basés sur une méthode empirique rigoureuse qui compare la performance avant, pendant et après la mise en place du feedback, les résultats soulignent l'importance des pratiques de gestion du personnel dans l'amélioration du corps enseignant. Des interrogations centrales demeurent néanmoins à propos des déterminants de la qualité des évaluations et des feedbacks ainsi que de la prise en compte de ces derniers par l'enseignant, en particulier concernant le rôle potentiel des incitations externes pour les professeurs et les chefs d'établissement.

Pour finir, il existe une relation complexe entre la distribution des qualités pédagogiques des enseignants d'une part et le niveau et la structure des rémunérations de l'autre. L'accroissement continu de la participation des femmes dans le marché du travail ainsi que l'augmentation généralisée de la prime à l'éducation supérieure ont placé les établissements scolaires sous pression financière. Ces changements ont sans doute contribué au déclin de la sélection à l'entrée du métier d'enseignant relativement à d'autres professions. Ainsi, bien que les facteurs intrinsèques demeurent parmi les déterminants plus importants – si ce n'est les plus importants – de l'entrée dans la profession d'enseignant, la rémunération affecte certainement les décisions de carrière de nombreux aspirants enseignants.

Par ailleurs, la grille de salaire fixe mène sans doute à une moindre qualité d'enseignement pour un coût donné. Tout d'abord, les différences entre matières au

regard des opportunités de carrières alternatives posent la question de la différenciation des grilles de salaire entre matières. Ensuite, les résultats qui montrent un effet positif de la rémunération à la performance sur les résultats scolaires des élèves suggèrent que de tels mécanismes pourraient contribuer à améliorer la qualité de l'éducation. Il faut néanmoins noter que les grilles de salaire restent la forme dominante de rémunération et que des études supplémentaires sur les vertus de structures alternatives seraient désirables. Enfin l'absence générale de différenciation de rémunération selon les conditions de travail – comme par exemple le niveau de pauvreté – ont pour conséquence quasi-certaine l'exacerbation des différences de qualité de l'enseignement selon le revenu des familles.

Pris dans leur ensemble, les études suggèrent une prise en compte précautionneuse des rôles respectifs des incitations et de la régulation ainsi que de l'importance de la qualité des enseignants et des personnels administratifs tels que les directeurs d'établissement. Il y a sans doute des circonstances dans lesquelles le relâchement ou même la disparition de la régulation peuvent en fait aider à améliorer l'enseignement à moindre coût. Par ailleurs, les implications des grilles de salaire fixes concernant 1) la qualité de la formation des enseignants ; 2) la distribution de la qualité des enseignants suivant le revenu ou d'autres facteurs démographiques ; 3) les décisions jointes des professeurs et de l'administration qui déterminent l'entrée et le maintien dans l'enseignement méritent une attention accrue.

1. INTRODUCTION

A growing body of evidence highlights the effectiveness of the teacher as the primary determinant of the quality of education. Yet policies that succeed in elevating the quality of instruction have proved to be elusive, as high quality instruction cannot simply be easily regulated through specific curricula for teacher Initial Teacher Education (ITE) and Continuing Professional Development (CPD) or detailed regulations governing entry into the profession. Moreover, policies that expand the potential supply of teachers by reducing certification requirements have similarly not proven to be a panacea. Consequently, an effective approach to raising the quality of instruction is likely to have multiple dimensions that target the quality of new entrants, teacher effort, support and CPD, pedagogical coordination and the quality of hiring and retention decisions.

A (European Commission, 2013) report highlighted the growing consensus that raising teacher quality is key to improving the quality of education and realizing important benefits including a higher standard of living and a reduction in earnings and income inequality.² This recognition precipitated efforts to establish compensation, evaluation, and incentive and support systems to ensure that effective teachers are recruited, motivated and rewarded.

Our report builds on (OECD, 2009b), a report that synthesizes research and experiences from several OECD countries and perspectives on rewards for effective teaching in order to improve educational outcomes. No clear findings emerge from the OECD report. Our review considers more recent literature on many of the same issues, provides additional empirical evidence on the experiences of implementing such incentives and broadens the scope of the incentives considered to include both those targeted directly at teacher education programmes and those directed at school leaders who make recruitment, further education, and retention decisions and provide much of the feedback on the quality of instruction. A consideration of research that uses a range of methods and studies systems in a number of countries including England, Chile, Israel, Mexico, Singapore and USA provides a broad view of experiences with range incentive schemes. The OECD report considers the likely impacts and costs of particular policies and discusses evidence where available in order to provide additional guidance for education policy makers. It finds that the size and distribution of incentive-pay awards have tended to vary dramatically among programmes. Among others, it recommends that policy makers should consider potential trade-offs in the design of incentive programmes. In particular, larger awards tend to elicit stronger behavioural responses, some of which may improve the quality of education and others such as cheating or teaching to the test may not. The OECD report also stresses that multiple evaluations and performance objectives or benchmarks strengthen the connection between behaviour and reward and more generally highlights the importance of the details of implementation and

² See also (Hanushek, 1992); (Hanushek, 1996); (Sanders & Rivers, 1996); (Hanushek, et al., 2001); (McKinsey & Company, 2009) for evidence on these issues.

management despite the fact that the literature on the design components of incentive-pay programmes in the education sector remains limited. Finally, the OECD report emphasizes the importance of linking “...*policy innovation with rigorous, independent evaluations of both the short- and long-run impacts on student achievement, teacher attitudes and behaviour, and organisational dynamics.*”

It is important to recognize that pay for performance constitutes only one channel through which extrinsic incentives may affect the quality of instruction. Monetary incentives may also be introduced for institutions that educate teachers and for school administrators including school leaders who make recruitment and re-contracting decisions and provide mentoring and support.

Moreover, evidence suggests that it is important not to neglect the potentially important role of intrinsic (internal) incentives which represent “...*the self-desire to seek out new things and new challenges, to analyse one's capacity, to observe and to gain knowledge and is driven by an interest or enjoyment in the task itself, and exists within the individual rather than relying on external pressures or a desire for reward.*”³ Intrinsic incentives for teachers and administrators are thought to be closely connected with educational success and rewarding interactions with students. This appears to be particularly important in the case in schools serving disadvantaged children.

Many countries face serious teacher shortages resulting from wide range of factors including a rising skill premium in the labour market, expanded opportunities for women, and a decline in the perceived attractiveness of teaching as a profession. These amplify the policy challenge, as greater pressure on teachers to raise outcomes could be perceived negatively. Therefore incentives must be designed carefully in order to elicit better performance among existing teachers and to encourage more highly skilled to-be teachers to enter the profession.

This report places our synthesis of research on incentives and teacher effectiveness in a framework that recognizes the challenges of attracting talented people into teaching and the variation in the attractiveness of schools resulting from differences in working conditions. It considers multiple types of incentives including those directed at prospective teachers, current teachers, ITE programmes and administrators. Although the EU Member States' policy oriented research experiences receive particular attention, we also provide substantial evidence on experiences in other countries, including developing countries, which often have longer experiences with a broader range of incentives and provide more compelling and rigorous evidence on their effects.

2. TYPES OF INCENTIVES

³ Wikipedia.

- ***The distinction between intrinsic and extrinsic motivation constitutes a key difference for policy. Economic models tend to focus much more on extrinsic, particularly financial, incentives.***
- ***Incentives may affect the performance of existing teachers, the effectiveness of future teachers or some combination of the two.***
- ***Key factors that affect the decision to teach include the compensation structure, advancement opportunities as a teacher, and opportunity costs including foregone compensations and training in other occupations.***

The existing literature surveying incentives for teachers, though not their impact, is rich. Comprehensive reviews of various approaches and practices have been provided by several recent surveys (OECD, 2009b), (OECD, 2003), (European Commission, 2013). Therefore, in our review, we focus on the existing empirical evidence documenting actual impact of incentives – an issue explored much less. We recognize the difference between extrinsic and intrinsic incentives and selection versus productivity effects.

The distinction between intrinsic and extrinsic motivation constitutes a key difference for policy. Economic models tend to focus much more on extrinsic, particularly financial, incentives. There is economic research on intrinsic motivations as well, but little such work on teachers. A much richer research body on intrinsic motivation in teaching and ITE can be found in the psychology and pedagogy literatures.⁴

A second important issue concerns the channels through which incentives operate. Existing and future teachers, ITE and CPD programmes, and administrators may respond to incentives through an increase or reallocation of effort toward the objectives specified in the incentive structure. We refer to this as *incentive effects on productivity*, where productivity may be measured in multiple dimensions, only some of which are the objectives of the incentives.

Incentives may also affect the quality of individuals attracted into the professions of teachers, administrators and even into the ITE and CPD programmes. In fact supporters of incentives often focus on the desire to attract more talented teachers and administrators by elevating the return to skill and effort within public schools. We refer to this as *incentive effects on (self)selection*.

Note, importantly, that these two channels are likely to be interrelated. For example, incentives to raise achievement at schools may lead to much more rigorous evaluation practices including more selective recruitment of teachers. The effects of such efforts will depend in part on the impact of the incentives on the pool of applicants for teaching positions. In combination with policies that relax the requirement for teachers to attend formal ITE or CPD programme, such incentives

⁴(Ryan, 2014) and (Hout & Elliott, 2011).

may actually lead to a reduction in the demand for teachers with traditional teacher education if others are perceived to have the potential to be more effective teachers.

In addition, incentives to be a more effective teacher would be expected to alter the of ITE programmes and consequently to alter policies and practices of ITE programmes. One explanation for the failure to find a significant relationship between teacher effectiveness and the possession of a master's degree is that existing salary structures and licensing requirements that are largely unrelated to classroom effectiveness encourage teachers to opt for the least costly venues leading to certification - masters' course in terms of study load, demand of the curricula, effective duration of studies, and monetary cost, with less focus on its actual quality.

Given this environment, the compelling evidence that teachers with master's degree do not systematically outperform those with only a baccalaureate degree makes perfect sense: Is it worth bearing the costs of a rigorous master programme that will improve classroom effectiveness and the intrinsic reward from teaching but have little effect on pay or career advancement? Moreover, if demand for quality is weak, would it come as a surprise if ITE preparation programmes do not adopt structures and curricula that raise the future effectiveness of their students given that a higher quality programme is more costly to provide?

In addition, it is important to recognize that key factors that affect the decision to teach include the compensation structure (monetary and nonmonetary), advancement opportunities as a teacher, and opportunity costs including foregone compensations and training in other occupations. As regulations increase the time and money costs of becoming a teacher, more and more prospective teachers with good alternative opportunities are likely to decide to pursue another profession (Bacelod, 2007) and (Hanushek & Rivkin, 2006). Moreover, although (European Commission, 2013) points that altruistic reasons such as the desire to transmit values, to work with children and young people and the social relevance of work are referred to as the main drivers of the decision to become a teacher (see also section 6), the extrinsic rewards should not be ignored. It should also be understood that the notion of opportunity costs captures not only the current opportunities foregone but also future opportunities in one's career, as the earnings gap between teachers and other occupations requiring a tertiary education is likely to widen with years of experience (Eurydice, 2012/2013).

Finally, there may be circumstances in which incentives may not be necessary or make much of a difference. A study by (Timothy & Ghatak, 2005) studies incentives in mission-oriented organizations, such as schools, which employ workers who subscribe to the mission. They emphasize the role of matching the mission preferences of (school) leaders and staff including teachers in increasing efficiency. They point out that "*Matching economizes on the need for high-powered incentives. It can also, however, entrench bureaucratic conservatism and resistance to innovations.*" It is important to recognize, however, that expressed commitments to a mission do not equate to desired behaviours in service of that mission.

3. INCENTIVES IN TEACHER PREPARATION AND PROFESSIONAL DEVELOPMENT

- *Teacher salaries, job advancement and in some cases employment are only weakly related to classroom performance in many school systems.*
- *Certification as a teacher often requires the completion of particular types and amounts of pre-service and subsequently in-service preparation.*
- *The employment of school administrators and their pay are only weakly related to student achievement in many places.*
- *The weak relationships between administrator and teacher pay and career advancement on the one hand and job performance on the other dampens incentives for teachers to select more effective preparation programmes and administrators to provide more effective professional development programmes.*
- *Existing research provides little or no evidence of substantial variation in the quality of teacher preparation programmes as measured by the future effectiveness of the teachers they prepare at raising student outcomes.*
- *Evidence is mixed on whether teachers from alternative certification schemes such as Teach First or Teach For America outperform teachers with traditional preparation, but there is some compelling evidence that teachers from these schemes outperform others in mathematics.*
- *Existing research suggests that large-scale, intensive professional development programmes have little impact on the quality of instruction.*
- *Evidence suggests that feedback based on observations of teaching and student outcomes can significantly improve the quality of instruction. As the supervisors' stake in the success of the teacher strengthens, that supervisor will likely provide better and more honest feedback.*

A growing body of research investigates the quality of teacher preparation and professional development programmes in an effort to identify policies that improve the quality of instruction. In this section we review the evidence on teacher preparation and professional development programmes. Note that we adopt a broad view of each.

Evidence on initial teacher education (ITE)

Traditional ITE programmes in the Member States are typically organised either according to concurrent or consecutive models.⁵ In almost half of the countries, two different ITE models offering the same professional options coexist: a trainee teacher may follow a professional route from the start (the so-called ‘concurrent’ model of ITE), or begin with academic study of their subject before specialising as a teacher (the ‘consecutive’ model). ITE may last longer for those who prefer to qualify as teachers after a first standard academic (non-teaching) degree. However, in numerous countries the concurrent and consecutive routes through ITE last the same length of time. Teacher preparation includes both traditional teacher courses and other courses outside of that curriculum; a course of study outside of ITE programmes may be combined with intensive education prior to teaching, as is the case for programmes Teach First in the United Kingdom, Teach for America in the United States, and their clones emerging in numerous Member States. We highlight two key findings on teacher preparation programmes. The first concerns programme quality, and the second concerns alternative certification.

Programme quality

Notwithstanding the importance of the sector and extensive regulations, there remains little compelling statistical evidence on the values of specific components of teachers’ education or even the variation in effectiveness among programmes of teacher education. For example, The National Council on Teacher Quality in the USA ranks teacher preparation programmes on the basis of 19 standards, including selectivity of admissions and content standards, and classroom management skills.⁶ The standards are conceptually appealing, but there is little evidence based on subsequent classroom performance in support of the measurement approaches used in the rankings.

A small but growing body of research on teacher preparation programmes in the United States attempts to measure programme effectiveness on the basis of the value added of graduates following their entry into teaching.^{7,8} Although some quantitative

⁵ See (Eurydice, 2015).

⁶ See (Greenberg, et al., 2014).

⁷ The only empirical evidence from a research relating ITE and education value-added comes from the USA. See (Goldhaber, 2013) and (Chetty, 2012-2013).

⁸ For comprehensive literature on the value – added measurement in OECD countries see (HoonHo & Lalancette, 2013) but note that it focuses on the concept of value-added as it relates to learning gains, and it does not address the value-added in terms due to ITE and value added in terms of economic gains. Also see (Rodgers, 2007 for a possible methodology for developing a performance indicator based on the economic value added to graduates.) (Ray, 2006) provides very detailed insight on the development of value – added models in England.

studies find significant differences across programmes, overall the findings suggest little variation in programme effectiveness as measured by graduates' value added to achievement.⁹

Note that the measurement of the quality of ITE programmes is a difficult task for a number of reasons, and existing evidence should be viewed with some caution. First, a prospective teacher chooses her preparation programme, and some programmes may attract students with much better academic records than others. Second, schools select teachers from an applicant pool of graduates from many preparation programmes, and schools likely rank candidates on the basis of a number of factors. Therefore comparisons of teachers from different preparation programmes who work in the same school may understate programme differences. For example, a teacher may have been one of the best graduates from a relatively low-quality preparation programme, while an equally skilled teacher may have been a mediocre graduate from a much higher-quality preparation programme.

Alternative certification

There has been considerable expansion of the use of alternative certification routes into teaching, particularly in high-poverty and/or low social profile communities. Teach First (TF) in the United Kingdom, and Teach for America (TFA) in the United States have become widely-known programmes of this kind. Programmes of similar nature are also appearing in other Member States.¹⁰ While thousands of TFA and TF corps member staff have taught over the years, only a small number of teachers in other Member States have come out of such programmes. The debate over the desirability of alternative certification programmes tends to focus on three issues: (1) the quality of traditional ITE programmes; (2) the extent to which the requirements of traditional preparation programmes discourage strong students from pursuing teaching as a profession; and (3) the extent to which the higher attrition rates out of teaching offset the benefits of using alternative certification to attract those with stronger academic backgrounds into the profession.

A number of studies have been conducted to gain a better understanding of the effectiveness of teachers educated via these alternative schemes compared to their colleagues with traditional ITE or teacher education. In the case of TF, (Allen & Allnutt, 2013) investigate whether the placement of TF's newly selected, inexperienced teachers into deprived secondary schools in England affected educational outcomes at age 16. They compare early TF programme participants with other schools within the same region and find that the programme has not been damaging to schools which joined. Rather the results show that TF produced school-

⁹ (Goldhaber, et al., 2012) find significant differences across programmes in the effectiveness of graduates in the teaching of reading but not maths. Moreover, (Koedel, et al., 2012) find that once sampling variability has been appropriately considered there is little evidence of substantial differences in the effectiveness of teachers trained in different programmes.

¹⁰ Internet <http://teachforall.org/en/our-network-and-impact/network-partners>

wide achievement gains on the order of 5% of a pupil standard deviation or around one grade level in one of the pupil's best eight subjects.¹¹

Perhaps the most compelling evidence comes from two randomized controlled trials of the effects of TFA. The first found that mathematics achievement was significantly higher among high-poverty elementary school students taught by a TFA teacher, while there were no significant differences in reading achievement (Decker, et al., 2004). The second found that high-school students taught by a TFA teacher had significantly higher mathematics achievement, while high-school students taught by teachers from another alternative certification programme did not outperform teachers with traditional certification (Clark, et al., 2013).

Given the absence of salary differences by subject taught, and the generally higher earnings opportunities outside of teaching for those with mathematics skills, it is likely that entrants into traditional teacher preparation programmes are weaker on average in mathematics than in the language arts. Consequently the finding that TFA teachers outperform others in mathematics fits with the belief that the fixed salary rates weaken the quality of instruction in mathematics relative to other subjects.

Evidence on continuing professional development (CPD)

Continuing professional development schemes may include highly structured and tailored programmes offered by an outside provider, as well as induction and mentoring by school leaders or other school system personnel. We highlight two key findings on in-service education. The first concerns large-scale CPD, and the second concerns evaluation and mentoring by the school leader or her designee.

Schools in many countries devote considerable time and financial resources to professional development, both to improve the quality of instruction and to make teaching a more attractive profession. (Eurydice, 2015) is mapping detailed patterns of CPD across OECD countries. (OECD, 2014b) highlights the influence of financial support on the intensity of participation in CPD and notes that in some countries other non-financial incentives function well too. It concludes that *“both lack of incentives and conflicts with the work schedule seem to be the most common reasons for not taking part in CPD”*.

The practice in Singapore reported in (OECD, 2009b) provides a good and rare example of efforts to support CPD. In addition to 100 hours of professional development available to every teacher, Singapore provides reimbursements of 260-450 euro per year for CPD expenses incurred by teachers. Teachers may purchase software, take foreign language or computer training, join professional organisations, subscribe to journals or participate in activities to enhance their cultural awareness.

¹¹ Further studies researching the impact of TF teachers in schools are by (Hutchings, et al., 2006), (Muijs, et al., 2010).

Teachers may also arrange for full-time or part-time professional development leave, partially funded by the ministry. They may study or travel abroad, teach in an international school, or work in the private sector to understand better the applications of the subject they are teaching. The goal is to improve professional skills in order to raise the quality of instruction for Singapore's students.

Two recent randomized controlled trials funded by the Institute for Education Sciences of the United States Department of Education found little or no evidence that intensive professional development programmes designed to support instruction in 7th grade mathematics and 1st grade reading raised the quality of instruction and student achievement. Each of these programmes followed established best practices and combined a summer institute, in-school follow-up seminars and intensive coaching. Yet, despite their intensity and substantial cost, neither had a significant effect on achievement.¹² These experimental findings raise serious questions about the benefits of intensive CPD, particularly given the substantial financial and time costs. It appears that professional development can affect teacher knowledge and practice, but any such effects are neither large nor beneficial enough to raise achievement. Moreover, the effects on both knowledge and practice appear to fade out over time.

The apparently low return on investments in large-scale CPD programmes does not imply that continuing professional development and support are not fundamental to establishing and maintaining high quality instruction. To the contrary, research discussed below suggests that feedback received as part of an evaluation process can improve teacher effectiveness. The benefits of such feedback provide evidence that the debate between incentives and professional development embodies a false choice, as an effective evaluation system can provide teachers with the type of feedback that

¹² (Garet, et al., 2008) conducted the study of 7th grade mathematics, and (Zhu, et al., 2008) conducted the study of early literacy. The middle school mathematics professional development consisted of a summer institute, a series of one-day follow-up seminars held during the school year, and in-school coaching visits conducted in association with the seminar days and delivered by the seminar facilitators. In the executive summary, the report on the mathematics professional development states that "*The specification of the professional development program was guided by the literature, which is largely based on correlational research and practitioner experience.*" The structure of the early literacy professional development was similar, though participants were divided into two separate treatment types. The first consisted of a teacher institute and seminar series, while the second added a half-time coach to work with second grade teachers for roughly 60 hours per year each. The results of the two studies showed some effects on teacher knowledge and practices but no significant effects on student achievement in any year. In the case of mathematics, the analysis showed that during the initial year of the programme the professional development had a significant impact on one measure of teacher practice and close to a significant impact on a second. However, it had no significant effect on teacher knowledge following the first or second years of the programme, though pooling the results for the two years did produce a significant effect.

In the case of early literacy, the study found significant positive impacts on teachers' knowledge and on one of the three instructional practices promoted by the professional development following the first year of the professional development. However, it found no significant effects on measured teacher outcomes in the year following the programme. Moreover, the added effects of coaching on teacher practices were not significant.

can provide them with the best opportunity to succeed in the classroom. Moreover, well-structured incentives can provide the impetus for administrators to offer meaningful feedback and for teachers to respond productively to their evaluations.

Results from a compelling study of the effects of observational feedback on the quality of instruction support the hypothesis that such feedback can raise teacher effectiveness. (Taylor & Tyler, 2012) use data¹³ for Cincinnati, Ohio, a medium-sized US city, to evaluate the effects of observation-based feedback and support by comparing achievement in a teacher's classes prior to, in the year of, and following her evaluation. The study found significant improvement in value added following the evaluation. Given that high stakes were not attached to these evaluations, the authors infer that it was the feedback per se and not any related incentives that raised productivity. Of course the benefits of such processes depend upon the quality of information provided by the supervisor or outside observer. It is likely that as the supervisor's stake in the teacher's success strengthens, that supervisor will provide better and more honest feedback. Importantly, observations and student outcomes potentially provide important information to guide decisions about contract renewal and tenure.

¹³ Their analysis spans 2003–2004 through 2009–2010 school years and their sample is composed of fourth through eighth grade math teachers and their students who were hired by Cincinnati public schools between 1993–1994 and 1999–2000.

4. PERFORMANCE-BASED-PAY

- ***Output-based pay is best used when output is well defined and easily measured, but human capital acquisition may be difficult to measure or only measurable in the distant future.***
- ***Policies that provide incentives to raise the quality of instruction can target teachers directly or indirectly through school leaders or other school stakeholders.***
- ***In this respect, group incentives are perceived as fairer and so are more likely to be introduced.***
- ***Both individual and group incentives have their pros and cons and the actual outcome depends on their optimal mix. Since the optimal mix is situation specific, it cannot be easily prescribed and school leaders therefore play an important role.***
- ***Additional evidence based on compelling research designs is needed prior to implementing financial incentives at the individual or group level if we are to raise teaching quality on a large-scale basis.***
- ***Scaled-up group teacher incentive programmes are still rare in the world, and so is empirical evidence.***
- ***Experience from existing studies suggests that the details of any incentive programme can be extremely important.***

Policies that provide incentives to raise the quality of instruction can target teachers directly or indirectly through school leaders or other school stakeholders such as parents, employers, school system administrators, and even students at higher schooling levels. Arguments in favour of school choice and competition such as those offered by (Friedman, 1962) emphasize the value of competition and parental pressure and the absence of pressure to raise school quality in many public school systems. The belief that competition among communities through housing values pushes jurisdictions towards higher quality and more cost-effective schooling is widely held but difficult to demonstrate empirically.¹⁴ The absence of such competition in some large cities or sparsely populated rural areas suggests that this type of Tiebout competition¹⁵ is not present in many communities. In other words, if

¹⁴ For more empirical evidence on the role of vouchers strengthening competition see (Carnoy, 1998) and (Filer & Munich, 2013).

¹⁵ The key notion of Tiebout concept of competition is that the local governments have a more precise and detailed knowledge of the needs of the local population, thus making them more readily able to accurately decide about provision of public goods to the local population. Given that individuals have differing personal valuations on public services and varying ability to pay the taxes, individuals move from one location to another maximizing their personal utility. The model implies that the residential choice process of individuals determines an equilibrium provision of local public goods matching the preferences of residents, sorting the population into optimum communities. The model solves major

housing options are limited by distance to work, difficulty finding another publicly-provided unit, discrimination, strong preferences for other neighbourhood amenities, or another factor, public schools may face little threat of losing students due to inefficiencies or low education quality.

Persistently low achievement or dissatisfaction with education outcomes has led a growing number of public school systems in the US and elsewhere to strengthen their evaluation systems and link evaluations to compensation, tenure or re-contracting decisions.¹⁶ Although the details differ, each of these systems rate teachers on the basis of some combination of student outcomes such as test scores, classroom observations, and feedback from students or parents. An extended review of teacher evaluation systems by (Murphy, 2013) concluded that properly designed evaluation (using test scores, classroom observations, and pupil surveys) “...*can improve the quality of teaching, provided it is accompanied by good feedback, and it can lead to better results for pupils and improved learning*”. They stress that “...*it is important that schools use a clear approach to appraisal that is well understood by every teacher, and that they provide effective training for any staff members involved in evaluation*”.

Extrinsic incentive programmes to raise the quality of instruction can be divided broadly into two categories. Individual incentives offer rewards directly to teachers who meet the criteria to raise an award, while group incentives offer rewards to groups of teachers or school personnel on the basis of student performance. We begin with a discussion of the conceptual underpinnings for various types of incentives and then turn to the empirical evidence.

Conceptual framework

A general theoretical framework for the consideration of incentives for teachers is provided by (Lazear, 2003) in which the author emphasizes the fact that “...*teachers, like all workers, likely respond to incentives. This means that the structure of compensation systems matters for the quality of instruction. A fixed salary schedule determined by inputs such as [years of] experience or [formal] education and not effectiveness in the classroom provides little extrinsic incentive for high quality teaching*”. This suggests that linking pay to student outcomes has the potential to improve the quality of instruction substantially. However, (Lazear, 2003) also highlights obstacles specific to the teaching profession that complicate the delineation of such incentives. Specifically, theory suggests that output-based pay is best used when output is well defined and easily measured, but in education human

problems with government provision of public goods: preference revelation and preference aggregation (Tiebout, 1956).

¹⁶ See (Dee, 2013).

capital acquisition may be difficult to measure or only measurable in the distant future in the case of any effects on earnings.

(Holmstrom & Milgrom, 1991) highlight another characteristic of education that complicates the use of incentives: the multiple objectives of schools. Incentive pay based on contribution to raising test scores, an outcome that can be quantified to some extent even if there are obstacles to isolating the teacher contribution, may lead teachers to focus more on raising achievement and exert greater effort to that end, but it may come at the cost of other valued outcomes. (Heckman, 2001) has also emphasized the adverse consequences of focusing too much on cognitive skills at the expense of non-cognitive skills, given their importance in the determination of future earnings, employment, and other non-labour market outcomes.

(Murphy, 2013) raises another problem related to access to information. In particular, “...*teacher evaluation metrics are not absolute and therefore they should only be used as indicators of performance*”. He argues that “*We must rely on the expertise of experienced school leaders to make informed decisions when appraising a teacher, taking all factors into account including those that impact on achievement and the strengths of each measure*”. Of course if school administrator behaviour that is not consistent with the objective of maximizing the quality of instruction is an impediment to school improvement, such reliance will not produce desired outcomes in the absence of the introduction of appropriate incentives and personnel policies for administrators.

Performance-related pay programmes at the individual level may also be constrained by teachers’ unions and, in some places, by government education policy based on ethical arguments and concerns, despite the fact that the performance component proposed is frequently small as a proportion of base pay. In this respect, group incentives are perceived as fairer and so are more likely to be introduced.

In comparison to individual incentives, group incentives tend to have the advantage of explicitly rewarding cooperation but the disadvantage of a weaker link between rewards and the efforts and accomplishments of individual teachers. Group incentives could potentially avoid potential adverse consequences caused by individual incentives including low attention to complementarities in different subjects, poor coordination and sequencing of curricula across classrooms, or excessive home-work or examination burdens in certain subjects. As (Tirivayi, et al., 2014) notes, “...*in the large survey of group incentives, theoretical predictions on whether group incentives are effective or more effective than individual incentives are ambiguous. Group incentives can either cause free riding and negatively impact performance or lead to similar or larger effects than individual rewards depending on conditions like smaller group sizes where peer monitoring and complementarities are enhanced.*”

Group incentives for teachers can take many forms. Limiting their attention to pecuniary ones, (Tirivayi, et al., 2014) provide a basic typology of performance-based bonus schemes: tournament incentives, school-wide incentives, and team-based

incentives. School-wide incentives base rewards on school-average performance instead of individual teacher contributions. Team-based incentives distinguish teams within a school and are not linked to overall school performance.

Even among those who support an expansion of incentives, there remains little agreement over their appropriate structure. One key point of disagreement is the desirability of individual as opposed to group incentives. The desirability of group versus individual incentives hinges on the effects of various types of incentives on cooperation among teachers, the value of that cooperation in terms of student outcomes, teacher responsiveness to incentives in terms of effort and focus on rewarded outcomes, and effects on school leader behaviour. Note that these are not mutually exclusive approaches, and the integration of the two potentially addresses the deficiencies in systems that focus solely on one or the other.

A third conceptual issue concerns the award determination structure. One approach is to rank schools, teams, or teachers and then give awards to predetermined proportion. The alternative approach is to establish specific thresholds and award all who reach the threshold.

In tournaments, schools or teachers are ranked based on achievement, value added, or some other measure and rewards are determined by performance relative to others. (Ladd, 1999), (Tirivayi, et al., 2014) and (Lavy, 2002) highlight some advantages of rank-order tournaments without absolute performance thresholds. These include the avoidance of arguments over the proper benchmarks, pressure to give many awards and uncertainty in total payments, as the pool of bonus money is fixed. However, the tournament structure may be perceived as punitive in environments in which many schools or teachers improve but only a few receive rewards.

The perception that a bonus scheme is fair in the sense that schools are not disadvantaged by the composition of their student population, available resources or other factors is an important consideration for any incentive structure, including tournaments. A belief that the probability of winning is much higher at some schools than others will introduce disadvantages into teacher and administrator recruitment and retention efforts in the schools perceived to be at a disadvantage. This becomes particularly problematic if these schools serve disadvantaged children. One can overcome some of these problems considering a scheme linking awards to improvements, instead absolute achievement, but we are not aware of reliable impact study of such a programme.

Evidence on the impact of teacher incentive programmes on students' performance

There is a small but growing body of evidence on the effects of incentives including randomized controlled trials. Much of the research focuses on developing countries and the US and little within Member States. A description of various incentives

schemes used in the developed world are provided by (OECD, 2003), and a very comprehensive survey of evidence on performance based schemes from various standpoints is provided by (OECD, 2009b). In an earlier survey, (Burns, et al., 2012) summarize evidence based on randomized controlled trials and other compelling research designs conducted in developing countries and the US; there is little or no evidence for Member States. They conclude that “...*performance pay incentives are more likely to have significant and positive effects on the quality of instruction in the presence of relatively weak teacher professionalism, relatively large bonus size, focused performance metrics, “fair” performance metrics, and rewards clearly linked to prior-period results.*”

There are three quite recent papers that provide additional information on performance pay effects in the US. First, in a study of teachers in high-poverty school districts in Texas, (Jackson, 2010) studied the effects of a programme that pays both high school students and teachers a bonus for passing grades on advanced placement examinations.¹⁷ The results showed not only a positive effect on advanced placement course enrolment and examination test-taking but also on college entrance examination scores and matriculation to college.

Second, (Fryer, et al., 2012) examine the importance of incentive structure in the determination of incentive effects using a field experiment. Specifically, they compare the effects of giving teachers the entire bonus at the beginning of the year under the condition that teachers could lose part or the entire bonus if their performance is not high enough, versus a standard bonus structure that pays a bonus at the end of the period based on performance. The results reveal that loss aversion is extremely powerful, as the effects on achievement are much larger for teachers who receive the bonus at the beginning as opposed to the end of the period.

Third, (Imberman & Lovenheim, 2015) estimate the impact of incentives on the scores for tests that determine incentive pay and the scores for tests that are not part of the incentive programme. They find that “...*achievement on incentivized exams, but not non-incentivized exams, improves when incentives strengthen. This highlights the potential for incentives to raise achievement, and the danger that poorly-structured incentives might distort teaching by encouraging too narrow a focus on tested items.*”

England and Wales adopted performance-related pay in the 2000s. The introduction of performance-related pay with performance management in the state school sector of England and Wales represented a considerable change in the school management system. From the year 2000, all teachers have been subject to annual goal setting performance reviews. Experienced teachers were offered an extended pay scale based on performance rather than seniority, and to gain access to the new upper pay scale, teachers had to go through a ‘threshold assessment’ based on their professional skills

¹⁷ Advanced placement courses are high school courses that can lead to college credit if students pass the examination.

and performance. Using matched student-teacher data and both average achievement and value added as measures of teacher effectiveness, (Atkinson, et al., 2009) estimated the impact of the incentive pay programme. They found that *the “...scheme did improve test scores, and value added increased on average by about 40% of a grade per pupil.”*

(Marsden & Belfield, 2006) report the results of a panel survey of classroom and head teachers which started in 2000, just before the implementation of performance-related pay in England and Wales. They found that *“...both classroom and head teacher views have changed considerably over time, from initial general scepticism and opposition towards a more positive view, especially among head teachers by 2004.”* They also argue that *the “...adoption of an integrative bargaining approach to performance reviews explains why a growing minority of schools have achieved improved goal setting and improved pupil attainment as they have implemented performance management.”*

In a cross-country study that uses variation in the use of performance pay across countries, (Woessmann, 2011) estimated student-level international education production functions combining country-level performance-pay measures with PISA-2003 international achievement micro data. The study finds that *“...the use of teacher salary adjustments for outstanding performance is significantly associated with math, science, and reading achievement across countries. Scores in countries with performance-related pay are about one quarter standard deviations higher. Results avoid bias from within-country selection and are robust to continental fixed effects and to controlling for non-performance-based forms of teacher salary adjustments.”*

Scaled-up¹⁸ incentive programmes remain rare, and consequently there is a lack of empirical evidence. As described by (Alger, 2014), some information is provided by the 2007 Portuguese reform that divided the single pay scale for teachers into two distinct scales. As part of this reform, near automatic tenure-related progression along the pay scale was replaced with performance-based progression based on a variety of factors. Promotion from the lowest to the highest pay scales under this system amounted to roughly 25% of monthly gross salary. Moreover, teachers who performed especially well and met pre-determined targets would be eligible for a one-time bonus, worth roughly one month's salary. Prompting this reform was the existence of relatively high education and teacher compensation expenditures despite ongoing poor student performance on international assessments (Martins, 2009). The study found that the focus on teacher effectiveness adversely affected student performance. In particular, student performance dropped by up to 0.40 of a standard deviation in national examinations. The decline was less pronounced at the school level, indicating that teachers were responding to pay incentives by inflating grades. (Martins, 2009) noted that the findings confirm that *“...teachers respond to incentives in a predictable way,”* and that ongoing research should focus on *“...which specific performance-related pay setups generate the best results for students.”*

¹⁸ For a detailed overview of problems when evaluating scaled-up programs see (Duflo, 2004).

(Alger, 2014) also describes the reforms implemented in Israel and Chile. In 1995 Israel adopted a 1.1 million euro group incentive programme for schools, partially in response to the arrival of a growing numbers of immigrants, many of whom were disadvantaged in terms of income and language status. Schools ranking in the top third based on their relative performance improvement received an award. (Lavy, 2002) concluded that the school performance incentives “...led to an increase in the proportion of students, especially among those from a disadvantaged background, who qualified for a matriculation certificate.”

The Chilean reform was introduced in 1996, when a monetary-based productivity bonus was incorporated into its standardized test scores system. It takes the form of a rank-order tournament covering all municipal and private subsidized schools in the country. This scheme sought to use a monetary incentive allocated at the school level to improve teacher performance. Awards are based mainly on test score results. The competition took place within distinct groups of schools and therefore represents a group incentive programme in which schools compete against each other and monetary rewards are distributed equally among all teachers in the winning schools. (Contreras & Rau, 2012) estimated a positive and significant tournament effect on the participating schools of between 0.14 and 0.25 standard deviations for language and maths test scores.

Finally, a recent survey by (Tirivayi, et al., 2014) summarizes evidence on group incentives in education. The survey concludes that, “...it is not possible to draw robust conclusions, as it is not possible to carry out a meta-analysis of empirical evidence given the diversity of student outcomes, design, and methodological approaches used in studies.”

5. NON-MONETARY INCENTIVES

- ***Material conditions affect the prestige and social status of a teaching career. Certain aspects of working conditions are relatively easy to improve, while others are more expensive.***
- ***Non-pecuniary job characteristics affect labour supply and the level of financial compensation necessary to attract and retain teachers of a given quality.***
- ***A lack of educational resources in the home adds to the burden of teachers, and some may respond with a preference for jobs in middle class communities.***
- ***Academic, economic and social disadvantages raise the cost of attracting teachers.***
- ***The use of money to compensate for less than desirable working conditions remains a key policy option.***

- ***Sorting of workers by preferences can attenuate the need to raise pay to compensate for high risk or other aspects of a job.***
- ***Fringe benefits such as pensions, insurance and other non-salary compensation may be particularly important to teachers, especially in countries with relatively low salary levels in comparison to other professions.***

It is well established theoretically and supported by rich empirical evidence in the field of labour economics that non-pecuniary job characteristics affect labour supply and the level of financial compensation necessary to attract and retain workers of a given quality. In the case of education such factors likely play a particularly important role. On the one hand, teaching offers many intrinsic benefits including the satisfaction felt from helping students learn and develop that draws talented people into the profession despite lower salaries than they could earn elsewhere. On the other hand, the lack of respect toward teachers in many situations, inadequate facilities including classrooms and bathrooms in disrepair, low teacher/student ratios, student misbehaviour and violence are likely to be some of the factors that discourage entry and persistence in teaching and increase the wages necessary to make teaching attractive. There are also factors that elicit a range of responses. Perhaps the most important of which are the family and community circumstances in which the children reside. A lack of educational resources in the home adds to the burden of teachers, and some may respond with a preference for jobs in middle class communities. However, others may derive great satisfaction from teaching children with disadvantages and actually prefer such jobs even in the absence of any financial inducements. On balance the evidence suggests that academic, economic and social disadvantages raise the cost of attracting teachers (Hanushek & Rivkin, 2004).

Management practices also influence the willingness to enter and remain in teaching. (Weiss, 1999) and (Hart & Murphy, 1990) point out that new teachers are more likely to value school-level autonomy, opportunities for individual initiatives and substantial professional control over resources, preferences that often clash with existing practices and policies. Even talented candidates who are entering teaching may be expected to have difficulty sustaining their initial commitment unless workplace conditions become more supportive. Typical sources of frustration for beginning teachers are commonly mentioned: student management, lesson planning, alienation, isolation, denigration of personal interests and dependence on outside opinion and observation.¹⁹(McDonald, 2005) summarizes findings from developed countries²⁰ around the world concluding that over time “...teachers have become dissatisfied with burdensome administrative tasks and expectations for curriculum

¹⁹ (Huberman, 1989) presents the results of a study involving 160 secondary teachers in Switzerland. See also (Gritz & Theobald, 1996) and (Singer & Willett, 1991).

²⁰ For specific features observed in less developed countries see (Chapman, 1994); (Tarifa & Kloep, 1994).

*change, while at the same time have a sense of increased levels of accountability, surveillance and role conflict, especially young and beginning teachers.”*²¹ In most EU Member States, there is a strong sense that conditions within schooling and those shaping schooling have deteriorated, leading to increased levels of dissatisfaction and stress, and in some cases attrition (European Commission, 2013).

Higher salaries can offset an undesirable work environment, though there is little or no evidence on the amount of compensation necessary to overcome specific aspects of schools that elicit displeasure. An important consideration in the case of teaching is the difficulty predicting job satisfaction prior to actually working in a school. In this sense teaching is a type of experience good, where new entrants to the profession modify their views of the job with experience. Nonetheless, the use of money to compensate for less than desirable working conditions remains a key policy option and an important issue in debates about the rules allocating public funding in support of particular schools (see section 6, subsection Differences in teacher supply by subject and location).

A fundamental distinction arises between aspects of schools that are almost universally liked or disliked such as family-friendly vacations and draconian working conditions, and aspects of schools that elicit mixed responses including the desirability of working in schools serving disadvantaged students. Studies on other occupations find that sorting of workers by preferences can attenuate the need to raise pay to compensate for high risk or other aspects of a job that many do not value, and such sorting likely functions similarly in the case of teaching.

Recent research by (Hanushek, et al., 2004) and (Hanushek, et al., 2005) highlights the importance of success in the classroom as a determinant to remain in teaching, particularly in academically disadvantaged schools. Their analysis of a large urban district in the United States finds that the probability of leaving the public schools entirely is significantly higher for less effective teachers. This provides evidence in support of the belief that school resources and policies that facilitate learning and a feeling of accomplishment can elevate retention rates. This may be a particular challenge in some communities, nonetheless, both the direct benefits in the form of greater student success and indirect benefits in terms of higher quality instruction at a given salary level may be substantial.

Contrary to the economics literature, the sociology literature pays greater attention to the effects of the level of respect for teaching expressed by communities and governments. (Chapman, 1994) points to the rather low and declining recognition in many developed countries. (Ravindranadham, 1993) and (Wagner, 1993) document that this is often accompanied by a lack of local parental support. (MacDonald, 2004) notes that “...*this problem has been exacerbated through the pressures of changing social conditions which prevail on schools. While the repercussions of technology, new educational priorities, multi-culturalism and the expanded social roles of*

²¹ (Huberman, 1989); (Kushman, 1992); (McDonald, 2005); (Neave, 1994).

schools may vary in their impact across and within countries, many teachers are left feeling unable to cope and less inclined to remain teaching.”²²

A valuable comparative survey of various indicators describing the professional status of teachers in EU Member States has been published recently by the European Commission (European Commission, 2013). The survey provides information on how intensively teachers perceive the importance of non-monetary work characteristics and the potential trade-offs vis-à-vis monetary compensation, and it highlights notable differences across Member States. For example, it observes that material working conditions for teachers are relatively heterogeneous among Member States, sometimes even among schools and areas within a country. These conditions are closely related to the availability of classrooms of different sizes, preferably also offices, easy access to ICT and multimedia equipment, the quality of the catering at work, the possibility to find reasonable housing that is compatible with a teaching salary, etc. Certain aspects of these working conditions are relatively easy to improve, while others are more expensive. (European Commission, 2013) stipulates, that material conditions seriously affect the prestige and social status of a teaching career.

This phenomena has been also documented by others including (Sturman, 2002) and (Eurydice, 2012/2013), the latter of which points out that *“Salary levels, supplemented by the award of possible additional allowances, and good working conditions may be two of the major incentives that ensure high motivation of teachers and make the teaching profession more attractive.”* (Weiss, 1999) highlighted the importance of a supportive workplace during a formalized induction year that socializes new teachers into a collaborative and a participatory work-ethic that sustains commitment. Probably most important, the development of responses to high rates of attrition inevitably focuses attention on the special predicament of new teachers who, more than any other group, are most vulnerable to the effects of workplace conditions. It is well known by many that the morale and commitment to teaching are not associated only to the decisions to enter and remain in teaching but also to effort and the quality of teaching. Other authors such as (Murphy, et al., 1989) claim that the most promising teachers leave teaching because they do not believe that good teachers will be consistently rewarded with pay, authority, and career opportunities. Finally, fringe benefits including pensions, insurance and other non-salary compensation may be particularly important to teachers given the relatively low salary levels vis-à-vis other comparable professions and fairly limited salary increases with experience in most countries. Along with the institution of tenure and other forms of job security, such benefits insure teachers against various risks and form a trade off with higher and more variable salaries. The ongoing debate over the desirability of a closer link between pay and performance and less job security covers a central issue in the structure of teacher employment and compensation.

²² (Gritz & Theobold, 1996); (Neave, 1994); (Wagner, 1993).

6. IMPLICATIONS OF THE FIXED SALARY SCHEDULE

- *Expansion of labour-market opportunities for women and increasing returns to tertiary education have substantially increased the opportunity costs of becoming and remaining a teacher. These trends reduce the supply of teachers. Fragmented evidence from Member States indicates deterioration of abilities of teachers relative to comparable professions in individual countries.*
- *Although across the board wage increases can offset some of the supply pressures caused by the rise in alternative earnings opportunities, they are not a cost-effective way of increasing the quality of entering teachers or retaining effective teachers.*
- *Alternative routes to the teaching profession have become more readily available in recent years. This has introduced a wedge between the incentives to enter the teaching profession and the incentives to complete traditional teacher education.*
- *Compensation increases should be structured in a manner designed to achieve specific objectives with regard to the quality of instruction.*

Expected compensation over the career as a teacher in comparison to alternative opportunities is one of the primary factors that influence the decision to enter an ITE programme, become a teacher, and remain a teacher, and the widely used fixed salary schedule has a number of implications regarding the distribution of teacher quality. Above we have discussed the consequences of having little or no link between performance and pay, and here we focus on the implications of pay equality across subjects in addition to describing overall trends over time in relative teacher salaries and skills.

(OECD, 2009b) reiterates the very important stylised fact that the single salary schedule has been the dominant form of compensation for teachers across the world for over half a century. In most Member States, the pay structure for public school teachers is based largely upon completed schooling and years taught, and depends little on the teacher's actual performance or the specific circumstances of their position (Eurydice, 2012/2013). Consequently, the single schedule provides a secure salary with small annual increases for remaining on the job, regardless of performance. Differences in salary levels are regularly negotiated with trade unions at the national, regional and local levels, but these negotiations have generally considered the level of pay rather than the structure. The decoupling of pay and performance reduces risk for teachers, dampening both the reward for higher performance and the sanctions for deficiencies in the classroom.

(Eurydice, 2012/2013) notes that “...around half of European countries pay allowances to teachers for excellence in teaching,...” though also reports that the overall level of salaries is relatively low and the share of the premium on top of the base salary is relatively small. The problem of non-competitive teachers’ salaries is exacerbated in countries where there are narrow wage grids that do not reward teachers adequately for their growing experience (or compensate for the growing salaries of other career options) and do not allow for a sufficiently high variable salary part in order to incentivise the delivery of high quality teaching (Eurydice, 2003).

Changes in relative teacher salaries over time provide strong evidence that the expansion of labour-market opportunities for women and increasing returns to tertiary education have substantially increased the opportunity costs of becoming and remaining a teacher and led to deterioration in the relative abilities of teachers in the United States (Bacelod, 2007). The study documents a marked decline in the test scores of young women teachers relative to non-teachers between 1960 and 1990; it also provides confirmatory evidence based on the quality of the undergraduate institution attended. Using a stylised model of occupational choice the study highlights how occupational differences in the returns to skill influence teacher quality. The empirical results then show the implications of the expansion of labour-market opportunities outside of teaching.²³

Although the study by (Bacelod, 2007) only describes developments in the US, there are good reasons to believe that the Member States have been experiencing similar developments. Growing returns to skill and the expansion of opportunities for women are global phenomena manifested not only by a widening of the wage/salary gap between tertiary educated and less educated workers but also increased variation within education groups. Increased wage inequality among workers with tertiary education places particular pressure on the teaching profession, as the opportunity for college graduates to earn substantial sums in other occupations deters entry into teacher preparation programmes and graduate entry into the profession, and makes retention of early-career teachers more difficult.

It should be noted that the expanding earnings gap may elevate the appeal of alternative certification, because a prospective teacher may enter the profession without concentrating university studies on teacher preparation. The opportunity to acquire human capital that is valued in other occupations reduces the risk of entering

²³ Another study of the effects of opportunity cost is (Gilpin, 2011). This paper explores the effect of the alternate occupation opportunities and the teacher work environment on teacher attrition. Using non-teaching wages of former teachers to estimate the determinants of teacher attrition, including the wage differential between teaching and non-teaching occupations, as well as the teacher work environment. The results suggest that the wage differential only matters for inexperienced teachers with fewer than 6 years of teaching experience, while the work environment affects both inexperienced and experienced teachers. The magnitude of the wage differential is small relative to the effect of the teaching work environment on teachers’ exiting decisions. However, they do not find any compensating differentials. For inexperienced teachers, a teacher practicum, i.e. student teaching, is found to reduce attrition while certification and education degrees have no effect. Lastly, living in a household with above average income significantly increases teacher attrition.

the teaching profession by lowering the expected cost of transitioning to another occupation.

A large and persistent salary gap between teachers and other tertiary educated employees is well documented in many Member States (OECD, 2014). Given that teachers' wages and salaries have stagnated recently in many Member States (Eurydice, 2012/2013), this has reduced the payoff to teaching in comparison to other occupations. Evidence also suggests that such pay differentials contribute to teacher turnover. In a comprehensive review, (MacDonald, 1999) concluded that in developed countries such as the USA and the United Kingdom, 65% and 89% of teachers, respectively, cited pay as their primary motivation for leaving the profession (Hammer & Rohr, 1992); (Wagner, 1993). In a detailed study of pay and turnover in the USA, (Gritz & Theobald, 1996) reported that the decisions of all male teachers and more experienced female teachers to remain in teaching were most strongly influenced by the comparison of teaching with non-teaching salaries.

The appropriate response to the expansion of alternative opportunities and associated pressure on wages depends critically on the overlap in skills between teaching and other occupations, the sensitivity of teachers and prospective teachers to salary changes, and other aspects of teacher pay. (Leigh, 2012) observes that there is mixed evidence on the relationship between pay and the aptitude distribution of teachers. The study suggests that the difficulty separating labour supply effects from labour demand effects likely contributes to the absence of a clear relationship between pay and supply. In an effort to identify the effects of pay on labour supply, (Leigh, 2012) use a unique dataset that includes anyone admitted into an Australian university between 1989 and 2003 to explore how interstate variation in average pay or pay dispersion affects the decision to enter teacher education courses. Importantly, the data contain test scores which allow some control for skill differences. The analysis finds that a 1 percent rise in the teacher starting salary boosts the average aptitude of students entering teacher education courses by 0.6 percentile ranks, with the effect being strongest for those around the median. This result is robust to instrumenting for teacher pay with the uniform salary schedules for public schools. It also finds some evidence that greater pay dispersion in the non-teaching sector lowers the aptitude of potential teachers.

Given the fact that across-the-board pay increases primarily benefit teachers already in the profession, it is rather expensive way to make teaching more attractive for early-career and prospective teachers. Some local education authorities, including Washington, DC in the US, have experimented with linking higher pay and greater career risk. More generally, compensation increases should be structured in a manner designed to achieve specific objectives with regard to the quality of instruction.

Differences in teacher supply by subject and location

Fixed salary systems are often justified on the basis of fairness, but they carry with them serious implications for schools. Specifically, the existence of shortages in some schools and subjects and parallel surpluses in others is not surprising in a structure that ignores the realities of labour markets. In fact shortages of formally qualified teachers have been widespread across developed and developing countries. This is particularly so in the case of specific subjects, school types and locations. The US experience highlights location, school demographic characteristics, and subject taught as three factors that appear to be related to the probability of a shortage of teachers at the given wage and institutional structure.

If amenities at a particular location or working conditions reduce the supply of teachers, that school will not be able to attract as strong a pool of applicants as a school with more desirable amenities or better working conditions. The correlation in the US between the share of teachers that lack full certification and school poverty rate suggests that high-poverty schools face substantial impediments to hiring an effective teacher at the existing salary. If equity refers to an equal probability of being able to hire an effective teacher, the fixed salary schedule does not appear to be equitable. By comparison, a salary policy that raised pay in schools that served disadvantaged students or that were located in areas that lacked positive amenities could potentially produce a more equitable distribution of teachers.

The absence of salary differences by subject typically leads to subject differences in the quality of instruction, because those prepared to teach mathematics and science tend to have higher-paying job opportunities outside teaching. In particular, science, special education and mathematics teachers generally receive the same pay as those teaching history and languages, despite substantial differences in their alternative earnings opportunities. (OECD, 2009b) reports that “...school systems in OECD countries have developed financial incentives to attract and retain teachers in shortage areas²⁴, such as teaching in indigenous languages in Australia and Ireland or teaching in French in Brussels. In addition, England and Wales have established loan forgiveness programmes for teachers of mathematics, science, special education and technology. However, principals in countries participating in an OECD study of upper secondary schools reported that over 30% of their students attend schools where there are teacher shortages in foreign languages, mathematics, science, and technology.”

7. INTRINSIC MOTIVATIONS AND INCENTIVES

- ***One of the main drivers of intrinsic motivation is the sense of autonomy and control. Making sure teachers (students) stay motivated is more important than selecting properly motivated teachers (students) in the first place.***

²⁴ See (Sclafani & Tucker, 2006).

- ***ITE programmes should at least partially select candidates based on their intrinsic motivation. The same applies for recruiting teachers.***
- ***Hence, well thought-out support for teachers can be a potent driver for keeping motivation high.***
- ***Given the complexities, the discussion of intrinsic motivation and its impact on school performance is surprisingly limited in policy studies.***

Intrinsic motivation denotes the desire to engage in an activity for its own sake and not for an external reward. This internal desire can often translate into greater enjoyment of an activity or better performance. Intrinsic motivation is a complex topic with much depending on definitions and detailed discussion, and a comprehensive treatment is beyond the scope of this review. What follows are some basic points relating to intrinsic motivation in education drawn in large part from comprehensive reviews in (Ryan, 2014) and (Hout & Elliott, 2011).

Though complicated, the issue of intrinsic motivation has been rising in prominence. One of the reasons for this is that intrinsic motivation is frequently the key for mastering sophisticated tasks or acquiring advanced skills that cannot be easily broken down into simple steps and that are in ever higher demand in modern societies and economies. For instance, companies might invest heavily into personal development programmes to foster employee growth, but these programmes often miss their target if people do not see any reason to engage in the kind of personal growth that is offered. By the same token, an inner desire to achieve a certain goal often more than supplements financial incentives.

From this perspective, intrinsic motivation is critical when designing incentives for teachers. People often become teachers because they find working with children and young people deeply fulfilling (European Commission, 2013). For these people, teaching has a high compensating differential that might make up for the salary gap between them and other university educated workers.

There are two key issues for policymakers regarding intrinsic motivation – how to select teachers, and how to preserve and promote their motivation. A teacher’s reasons for entering the profession is extremely important. If it is driven mostly by external motivation – most importantly remuneration or lack of other alternatives – that might give rise to different aspirations for classroom work than if it is driven by the love of teaching.

ITE programmes should at least partially select people based on their intrinsic motivation. The same applies for the recruitment of teachers. There are many tools for assessing motivations for applying for a particular job, from standard human resources procedures to innovative school-specific assessment centres.

Even more important than selecting properly motivated teachers (students) is, however, making sure they stay motivated. One of the main drivers of intrinsic motivation is a sense of autonomy and control. In a school setting, this means that a teacher can decide on his or her goals and can then pursue them. The more the curriculum is determined externally and the more control over every facet of the teaching experience the school leadership tries to exercise, the lesser the sense of autonomy will be for the teacher, which weakens their intrinsic motivation. Teacher autonomy poses a particular challenge for policymakers, particularly in terms of the design of incentive systems. The specification of clear standards and objectives might be advantageous in order to coordinate efforts across grades and align instruction with goals of stakeholders, but too much specificity might make the job less interesting, creative and rewarding. This potential trade-off is complicated by the possibility that teachers might accuse school administrators of infringing on their professionalism and lowering morale with too much testing and overly specific objectives when the underlying dissatisfaction comes from a distaste for evaluation on the basis of student performance.

School workplace environment and lack of support and development are other important factors affecting motivation. Even a great degree of autonomy might not be sufficient to motivate a teacher faced with a hostile set of colleagues who distrust his or her work or with a burnt-out headmaster who only wants to see out his contract.

Similarly, opportunities for personal development can greatly abet teachers' motivation. Intrinsic motivation is often driven by a desire to master a certain topic or skill, and teaching is a skill one can evolve throughout his or her life. Hence, well thought-out and effective support for teachers can be a potent driver for keeping motivation high. In this respect the role of school leaders is indispensable.

It is clearly a challenge to develop practices and policies including incentive programmes that promote intrinsic motivation. Any such efforts need to take into account not only psychology and pedagogy, but also the institutional design of large scale bureaucracies (educational systems) and the social dynamic of collectives. Given the complexity of the issue, the discussion of intrinsic motivation and its impact on school performance is surprisingly limited in policy studies.

8. CONCLUSIONS

- ***Empirical evidence on incentives is fragmented, context specific, and often based on methods that do not produce compelling estimates of causal effects. Conclusions must be tempered to reflect the limitations of the evidence.***
- ***The expansion of earnings inequality and increase in the earnings of those with tertiary education raises the opportunity cost of***

teaching and the risk of investing in human capital that has little value outside of the teaching profession.

- ***Fixed salary schedule possesses deficiencies that likely adversely affect the quality of instruction and elevate the cost of public education potentially harming the least advantaged children.***
- ***Policy-makers should take great care in the development and implementation of incentive schemes and carefully monitor their impacts. Blind adoption of practices is by no means guaranteed to bring desirable outcomes.***
- ***Within Member States there remains the paucity of compelling studies that identify the causal impacts of a range of incentive programmes. Therefore, there is a need for much more rigorous empirical research.***
- ***Rigorous, policy oriented research on incentives in education should be supported and funded in order to ensure the availability of the necessary evidence upon which to build policies.***

Although the dominant structure of public education eschews incentives in favour of regulatory measures, incentives in education have proliferated more outside the Member States, particularly in the US and developing countries. Expanded school choice in the form of charter schools and school vouchers, an increase in the use of teacher and school leader pay for performance, widespread introduction of accountability systems in which schools may receive rewards or sanctions, and direct payments to students who meet achievement thresholds constitute but some of the existing incentive schemes. What becomes increasingly clear after a comprehensive review of the economics literature, however, is that evidence does not point clearly to a specific set of incentives for schools, current teachers or ITE or CPD programmes. Rather, the empirical evidence on incentives is fragmented, context specific, and often based on methods that do not produce compelling estimates of causal effects of incentives. Consequently, conclusions must be tempered to reflect the limitations of the evidence.

Nonetheless, some overarching themes emerge that highlight both areas for future research and for policy innovations. First, a weak relationship between effectiveness in the classroom on the one hand and compensation and employment opportunities on the other appears to dampen the incentive for prospective teachers to seek out and demand high-quality ITE programmes. Perhaps the absence of a significant relationship between possession of an MA degree and effectiveness in the classroom provides the most compelling evidence of this phenomenon, but it is by no means the only piece of evidence.

Second, the evidence on the effectiveness of teachers who have completed alternative certification raises questions about the wisdom of regulations that prescribe very

specific and often burdensome education requirements on prospective teachers that may have little value outside of the education sector. It appears that any benefits derived from such preparation are offset by the higher average skills of those who complete alternative certification. The expansion of earnings inequality and increase in the earnings of those with tertiary education not only raises the opportunity cost of teaching but also the risk of investing in human capital that has little value outside of the teaching profession.

Third, existing evidence suggests that large-scale CPD programmes have little effect on the quality of instruction despite their substantial cost in terms of both time and money. In contrast, evidence reveals substantial benefits to feedback based on observations of peers or supervisors and student outcomes. Consequently, policy makers and schools should carefully consider the character of teacher support they require and finance.

Fourth, a fixed salary schedule that does not vary by location, subject or job performance possesses deficiencies that likely adversely affect the quality of instruction and elevate the cost of public education. Moreover, when combined with evidence that poverty tends to be associated with less desirable working conditions, the fixed pay system likely exacts greater harm on the least advantaged children.

Fifth, the weak relationship between compensation and performance introduced by the fixed salary schedule likely decreases effort, discourages many talented applicants with good alternative opportunities from entering teaching, weakens competitive pressure on ITE and CPD programmes to improve, and dampens the willingness of school administrators to make the difficult decisions necessary to elevate and maintain the quality of instruction.

Sixth, although incentives may be appealing in the abstract, the details of plan implementation are of fundamental importance. This holds for policies that provide incentives for ITE programmes, prospective teachers, teachers and administrators. Perverse consequences can offset or even overwhelm the benefits of incentives, in large part because incentives transcend economics into areas of psychology and sociology. Consequently policy-makers should take great care in the development and implementation of incentive schemes and carefully monitor their impacts in order to make appropriate modifications. Blind adoption of practices observed elsewhere is by no means guaranteed to bring desirable outcomes. Given that each implementation takes place in different conditions, each incentive programme – especially large ones – should be subject to careful pilot evaluation if possible and certainly to ex-post impact evaluation.

For developed countries²⁵, there exist comprehensive recent surveys of teachers' incentives used (OECD, 2003), (OECD, 2009b) and indicators comparing the attributes of the teaching profession across the Member States (Eurydice, 2012/2013); (Eurydice, 2012); (European Commission, 2013). There are also several

²⁵ A comprehensive review on what makes schools work, including incentives schemes and accountability, has been provided by (Bruns, et al., 2011).

very detailed literature surveys on particular incentive schemes, such as performance-based incentives (OECD, 2003); (Podgursky & Springer, 2007) and group incentives (Tirivayi, et al., 2014), which go into much greater detail than our general review. Although they contain a great deal of information and evidence, these surveys also illuminate the paucity of compelling studies that identify the causal impacts of a range of incentive programmes. This is particularly true for Member States, where the lack of evidence is most glaring. Therefore, there is a need for much more rigorous empirical research in this area, including policy-oriented experimentation. This applies to each individual Member State since educational schemes differ and findings from one country cannot be easily generalised for other. An evaluation plan should ideally accompany any implementation of an incentive programme.

As repeatedly noted, there are many more rigorous scientific studies outside of Member States, particularly in the US and developing countries. A number of randomized controlled trials have been conducted in developing countries, producing a small but relatively rich body of evidence (Duflo, et al., 2012). The reason for this geographic concentration of research appears to be two-fold: (i) those who provide development assistance frequently ask for evidence on its impact, and there tend to be fewer political obstacles to conducting experiments in developing countries; and (ii) in some EU Member States the opposition to rigorous research may be stronger than advocates for such studies.

It is hard to overstate that successful policy development and implementation of schooling systems in Member States can benefit substantially from more intensive research and ongoing evaluation providing reliable evidence. Whatever the reasons, the paucity of research in many Member States likely inhibits the development of a strong research base from which to develop education policies. Member States differ from each other as well as from developing countries and the US. This raises questions about the relevance of much existing evidence. The increasingly complex social landscape of Member States demands effective schools that support children from a wide range of backgrounds, and research should be made a fundamental building block to support successful systems of education.

Finally, scientifically rigorous, policy oriented research on incentives in education and schooling as well as other aspects of education should be supported and funded in order to ensure the availability of the necessary evidence upon which to build policies. Such evidence is also important to foster public and political debates about education reforms, including the volume and structure of public spending on education.

Bibliography

Muijs, D., Chapman, C. & Armstrong, P., 2010. *Maximum Impact Evaluation: the impact of Teach First teachers in schools. An evaluation funded by the Maximum Impact Programme for Teach First. Final Report*, Manchester: University of Manchester.

Alger, V. E., 2014. *Teacher Incentive Pay that Works: A Global Survey of Programs that Improve Student Achievement*, s.l.: Fraser Institute.

Allen, R. & Allnutt, J., 2013. Matched panel data estimates of the impact of Teach First on school and departmental performance. *DoQSS Working Paper*, September. Volume 13-11.

Atkinson, A. et al., 2009. Evaluating the impact of performance-related pay for teachers in England. *Labour Economics*, 16(3), pp. 251-261.

Bacelod, M. B., 2007. Do alternative opportunities matter? The role of female labour markets in the decline of teacher quality. *review of economics and statistics*, 89(4), pp. 737-751.

Bruns, B., Filmer, D. & Patrinos, H. A., 2011. *Making Schools Work: New Evidence on Accountability Reforms*, Washington DC: The World Bank.

Buckley, J., Schneider, M. & Shang, Y., 2004. The effects of school facility quality on teacher retention in urban school districts. *National Clearinghouse for Educational Facilities*.

Burns, S. F. et al., 2012. Team Pay for Performance: Experimental Evidence From the Round Rock Pilot Project on Team Incentives. *Educational Evaluation and Policy Analysis*, 34(4), pp. 367-390.

Carnoy, M., 1998. National Voucher Plans in Chile and Sweden: Did Privatization Reforms Make for Better Education?. *Comparative Education Review*, 42(3), pp. 309-337.

Chapman, D., 1994. *Reducing teacher absenteeism and attrition: causes, consequences, and responses*. Paris: UNESCO.

Chetty, R., 2012-2013. Value-added measures of teachers: research and Policy. *Focus*, 29(2).

- Clark, M. C. et al., 2013. *The Effectiveness of Secondary Math Teachers from Teach For America and the Teaching Fellows Programs (NCEE 2013-4015)*, Washington DC: National Center for Education Evaluation and Regional Assistance.
- Cohen, D. K. & Murnane, R. J., 1986. Merit pay and the evaluation problem: understanding why most merit pay plans fail and a few survive. *Harvard Educational Review*, 56(1), p. 1–17.
- Contreras, D. & Rau, T., 2012. Tournament Incentives for Teachers: Evidence from a Scaled-Up Intervention in Chile. *Economic Development and Cultural Change*, 61(1), pp. 219-246.
- Decker, P. T., Mayer, D. P. & Glazer, S., 2004. The Effects of Teach For America on Students: Findings from a National Evaluation. *Mathematica Policy Research*, June 9 .
- Dee, T. & W. J., 2013. Incentives, Selection, and Teacher Performance: Evidence from IMPACT. *NBER Working Paper No. 19529*, Volume October.
- Duflo, E., 2004. Scaling Up and Evaluation. In: *Annual World Bank Conference on Development Economics 2004*. s.l.:The International Bank for Reconstruction and Development / The World Bank, pp. 341-369.
- Duflo, E., Hanna, R. & Ryan, S. P., 2012. Incentives Work: Getting Teachers to Come to School. *American Economic Review*, 102(4), pp. 1241-1278.
- European Commission, 2013. *Study on Policy Measures to improve the Attractiveness of the Teaching Profession in Europe*. Brussels: European Union, 2013.
- Eurydice, 2003. *Key topics in Education in Europe: The teaching profession in Europe. Profile, trends and concerns.*, s.l.: Eurydice.
- Eurydice, 2012/2013. *Teachers' and School Heads' Salaries and Allowances in Europe, 2012/13*, s.l.: Eurydice.
- Eurydice, 2012. *Key Data on Education in Europe*, s.l.: Eurydice.
- Eurydice, 2015. *The Teaching Profession in Europe: Practices, Perceptions, and Policies*, s.l.: Education, Audiovisual and Culture Executive Agency (EACEA).
- Filer, R. & Münich, D., 2013. Responses of private and public schools to voucher funding. *Economics of Education Review*, 34(C), pp. 269-285.
- Friedman, M., 1962. *Capitalism and Freedom*. s.l.:University of Chicago Press .
- Fryer, R. G., Levitt, S. D., List, J. & Sadoff, S., 2012. Enhancing the Efficacy of Teacher Incentives through Loss Aversion: A Field Experiment. *NBER Working Paper No. 18237*, July.

- Garet, M. et al., 2008. *The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement (NCEE 2008-4030)*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.
- Gilpin, G. A., 2011. Reevaluating the effect of non-teaching wages on teacher attrition. *Economics of education review*, 30(4), pp. 598-616.
- Goldhaber, D., 2013. *What do value-added measures of teacher preparation programs tell us*, s.l.: s.n.
- Goldhaber, D., Krieg, J., Theobald, R. & al., e., 2012. Knocking on the door to the teaching profession? Modeling the entry of prospective teachers into the workforce. *Economics of Education Review*, Volume 43, pp. 106-124.
- Goldhaber, D. L. S. & T. R., 2013. The gateway to the profession: Assessing teacher preparation programs based on student achievement. *Economics of Education Review*, 34(June 2013), pp. 29-44.
- Goodman, S. & Turner, L., 2013. The Design of Teacher Incentive Pay and Educational Outcomes: Evidence from the New York City Bonus Program. *Journal of Labor Economics*, April, 31(2), pp. 409-420.
- Greenberg, J., Walsh, K. & McKee, A., 2014. *Teacher Prep Review*, s.l.: National Council on Teacher Quality.
- Gritz, R. M. & Theobald, N. D., 1996. The Effects of School District Spending Priorities on Length of Stay in Teaching. *Journal of Human Resources*, 31(3), pp. 477-512.
- Guarino, C., Santibanez, L., Daley, G. & BREWER, D., 2004. *A Review of the Research Literature on Teacher Recruitment and Retention*, s.l.: RAND.
- Hammer, C. & Rohr, C. R., 1992. *Teacher Attrition and Migration. Issue Brief. NCES 92-148*, Washington, DC: Office of Educational Research and Improvement..
- Hanushek, E., 1992. The Trade-off Between Child Quantity and Quality. *Journal of Political Economy*, 100(1), pp. 84-117.
- Hanushek, E., 1996. Who Chooses to Teach and Why?. *Economics of Education Review*, 14(2), pp. 101-117..
- Hanushek, E. A., Kain, J. F. & Rivkin, S. G., 2005. Teachers, schools and academic achievement. *Econometrica*, 73(2), pp. 417-458.
- Hanushek, E. A. & Rivkin, S., 2006. Handbook of the Economics of Education. In: E. A. Hanushek & F. Welch, eds. s.l.:Elsevier B.V..

- Hanushek, E. A. & Rivkin, S. G., 2004. How to Improve the Supply of High-Quality Teachers. *Brookings Papers on Education Policy*, p. 38.
- Hanushek, E. A., Rivkin, S. G. & Kain, J. F., 2004. Why Public Schools Lose Teachers. *Journal of Human Resources*, 39(2), pp. 326-354.
- Hanushek, E., Kain, J. F. & Rivkin, S. G., 2001. Why Public Schools Lose Teachers. *Journal of Human Resources*, 39(2).
- Hart, A. W. & Murphy, M. J., 1990. New Teachers React to Redesigned Teacher Work. *American Journal of Education*, 98(3), pp. 224-250.
- Heckman, J. & R. Y., 2001. The Importance of Noncognitive Skills: Lessons from the GED Testing Program. *American Economic Review*, May, 91(2), pp. 145-149.
- Holmstrom, B. & Milgrom, P., 1991. Multitask Principal Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design. *Journal of Law, Economics, and Organization*, Volume 7, pp. 24-52..
- HoonHo, K. & Lalancette, D., 2013. *Literature Review on the Value - Added Measurement in Higher Education*, Paris: OECD.
- Hout, M. & Elliott, S. W. eds., 2011. *Incentives and Test-Based Accountability in Education*. Washington, DC 20001, 500 Fifth Street, N.W.: National Academy of Sciences.
- Huberman, M., 1989. The Professional Life Cycle of Teachers. *Teachers College Record*, 91(1), pp. 31-57.
- Hutchings, M. et al., 2006. *An evaluation of innovative approaches to teacher training on the Teach First programme: Final report to the Training and Development Agency for Schools*, London: London Metropolitan University.
- Imberman, S. A. & Lovenheim, L., 2015. Incentive strength and teacher productivity : Evidence from a group-based teacher incentive pay system. *Review of Economics and Statistics*, 97(2).
- Jackson, C. K., 2010. A Little Now for a Lot Later: A Look at a Texas Advanced Placement Incentive Program. *Journal of Human Resources*, 45(3), p. 591–639.
- Koedel, C., Leatherman, R., Parsons, E. & al., e., 2012. Test Measurement Error and Inference from Value-Added Models. *The B.E. Journal of Economic Analysis and Policy*, 12(1).
- Koedel, C. P. E. P. M. & E. M., 2012. Teacher Preparation Programs and Teacher Quality: Are There Real Differences Across Programs. *CALDER Working Paper*, Volume 79.

- Kushman, J. W., 1992. The Organizational Dynamics of Teacher Workplace Commitment: A Study of Urban Elementary and Middle Schools. *Educational Administration Quarterly*, 28(1), pp. 5-42.
- Ladd, H. & S. L., 2015. Do Master's Degrees Matter? Advanced Degrees, Career Paths, and the Effectiveness of teachers. *CALDER Working Paper*, Volume 136.
- Ladd, H., 1999. The Dallas school accountability and incentive program: an evaluation of its impacts on student outcomes. *Economics of Education Review*, 8(1), pp. 1-16.
- Lavy, V., 2002. *Journal of Political Economy*, December, 110(6), pp. 1286-1317.
- Lavy, V., 2002. Evaluating the Effect of Teachers' Group Performance Incentives on Pupil Achievement. *Journal of Political Economy*, 110(6), pp. 1286-1317.
- Lavy, V., 2002. XXXEvaluating the effects of teachers' group performance incentives on pupil achievement. *Journal of Political Economy*, 110(6), pp. 1286-1317.
- Lavy, V., 2007. Using performance-based pay to improve the quality of teachers. *The Future of Children*, 7(1), pp. 87-109.
- Lavy, V., 2009. Performance Pay and Teachers' Effort, Productivity, and Grading Ethics. *American Economic Review*, 99(5), pp. 1979-2011.
- Lazear, E., 2003. Teacher incentives. *Swedish economic policy review*, 10(2).
- Leigh, A., 2012. Teacher pay and teacher aptitude. *Economics of Education Review*, 31(3), pp. 41-53.
- MacDonald, D., 1999. Teaching and Teacher Education. *Teaching and Teacher Education*, pp. 825-848.
- MacDonald, M. G., 2004. Teachers' knowledge of facts and myths about suicide. *Psychological reports*, 95(2), pp. 651-656.
- Marsden, D. & Belfield, R., 2006. Pay for Performance Where Output is Hard to Measure: The Case of Performance Pay for School Teachers. *Advances in Industrial & Labor Relations*, pp. 1-34.
- Martins, P., 2009. *Individual Teacher Incentives, Student Achievement and Grade Inflation*, s.l.: Institute for the Study of Labor.
- McDonald, M. A., 2005. The Integration of Social Justice in Teacher Education Dimensions of Prospective Teachers' Opportunities to Learn. *Education & Educational Research*, 56(5), pp. 418-435.
- McKinsey & Company, 2009. *The Economic Impact of the Achievement in America's Schools*, s.l.: McKinsey & Company, Social Sector Office.

- Murphy, M. J., Hart, A. W. & Walters, L. C., 1989. *Satisfaction and intent to leave of new teachers in target populations under redesigned work..* s.l., s.n.
- Murphy, R., 2013. *Testing Teachers: What works best for teacher evaluation and appraisal*, s.l.: The Sutton Trust.
- Neave, G., 1994. The Teaching nation: prospects for teachers in the European Community. *Comparative Education Review*, 38(1), pp. 148-150.
- OECD, 2003. *Performance-Based Rewards for Teachers: A Literature Review*. Paris: OECD.
- OECD, 2009b. *Evaluating and Rewarding the Quality of Teachers: International Practices*. Paris: OECD.
- OECD, 2012. *PISA 2012 Results: What Makes Schools Successful? Resources, Policies and Practices (Volume V)*, Paris: OECD.
- OECD, 2014b. *TALIS 2013 Results. An International Perspective on Teaching and Learning..* Paris: OECD.
- OECD, 2014. *OECD Education at a Glance, 2014*, Paris: OECD.
- Podgursky, M. J. & Springer, M. G., 2007. Teacher performance pay: A review. *Journal of Policy Analysis and Management*, Volume 26, pp. 909-950.
- Ravindranadham, S., 1993. *A comparative study of the social status of secondary school teachers working in government schools..* s.l.: s.n.
- Ray, A., 2006. *School Value-added measurement in England*, Paris: OECD.
- Reback, R., Rockoff, J. & Schwartz, H., 2014. Under Pressure: Job Security, Resource Allocation, and Productivity in Schools under No Child Left Behind. *American Economic Journal-Economic Policy*.
- Ryan, R. M., 2014. *The Oxford Handbook of Human Motivation*. Oxford: Oxford University Press.
- Sanders, W. & Rivers, J. C., 1996. *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement*, Knoxville: University of Tennessee Value.
- Sclafani, S. & Tucker, M., 2006. *Teacher and Principal Compensation: An International Review*, Washington, D.C.: Center for American Progress.
- Singer, J. D. & Willett, J. B., 1991. Whether to When: New Methods for Studying Student Dropout and Teacher Attrition. *Review of Educational Research*, 61(4), pp. 407-450.
- Sturman, L., 2002. *Contented and Committed? A survey of quality of working life amongst teachers*, s.l.: Education-line database.

- Tarifa, F. N. & Kloep, M., 1994. Working conditions, work style and job satisfaction among Albanian teachers. *International Review of Education*, Volume 40, pp. 159-172.
- Taylor, E. S. & Tyler, J. H., 2012. The Effect of Evaluation on Teacher Performance. *American Economic Review*, 102(7), pp. 3628-51.
- Tiebout, C., 1956. A Pure Theory of Local Expenditures. *Journal of Political Economy*, 64(5), p. 416-424.
- Timothy, B. & Ghatak, M., 2005. Competition and Incentives with Motivated Agents.. *American Economic Review*, 95(3), pp. 616-636.
- Tirivayi, N., van den Brink, H. M., Groot, W. & al., e., 2014. Group incentives for teachers and their effects on student learning: a systematic review of theory and evidence. *School Effectiveness and School Improvements*, 25(4), pp. 570-601.
- Umansky, I., 2005. A literature review of teacher quality and incentives: Theory and evidence.. *Incentives to improve teaching: Lessons from Latin America*, Volume Washington DC, pp. 21-61.
- Wagner, D. A., 1993. *Literacy and development: rationales, assesment, and innovation*, s.l.: University Of Pennsylvania.
- Weiss, E. M., 1999. Perceived workplace conditis and first-year teachers' morale, career choice commitment, and planned retention: A secondary analysis. *Teaching and Teacher*, Volume 15, p. 861879.
- Woessmann, L., 2011. Cross-country evidence on teacher performance pay. *Economics of Education Review*, Volume 30, pp. 404-418.
- Zhu, P., Sepanik, S. & Doolittle, F., 2008. *MDRC, Middle School Mathematics Professional Development Impact Study: Findings After the Second Year of Implementation (NCEE 20114024)*. Washington, DC: U.S. Department of Education, Institute of Education Sciences..

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