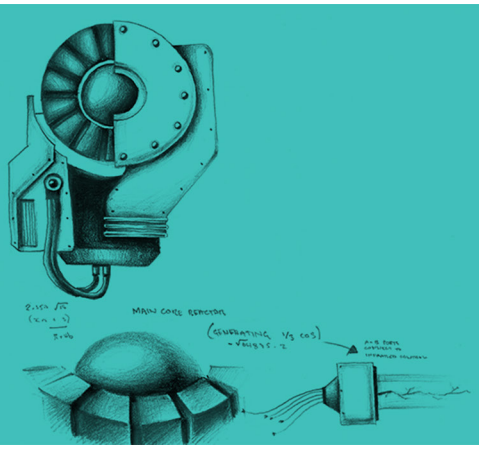
PRODUCTIVITY ALLOCATION AND SKILLS OF GRADUATES



An Executive Summary

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INTRODUCTION

Graduates learn skills
Earnings and production grow
Does the job matter?

Having a reliable supply of high-quality technical skills helps the economy become more productive and innovative in order to better compete in global markets. There are ongoing debates about the right quantity and mix of science, technology, engineering and maths (STEM) skills, and about whether non-STEM skills deliver similar benefits.

This paper focuses on the early career employment and earnings dynamics of young graduates from both STEM and non-STEM disciplines. We focus on two key questions. First, we examine the extent to which different graduates 'upgrade' their jobs and find a good match for their skills and training in the six years after graduation. Second, we estimate how their relative wages and productivity contributions vary early in their careers.

DATA AND METHODS

TThis study uses Statistics New Zealand's Integrated Data Infrastructure, an integrated data environment with longitudinal microdata about individuals, households and firms.

When analysing the upgrading of jobs, we looked at all tertiary qualifications gained during 2003–2006 that required at least half a year to complete, by people 30 years or younger, including both international and domestic students. We then follow these cohorts over six years as they enter the job market, looking at the following groups separately:

- high STEM graduates: with a bachelor degree or above in a STEM field;
- high non-STEM graduates: with a bachelor degree or above in a non-STEM field;
- low STEM graduates: who have a sub-bachelor qualification in a STEM field; and
- low non-STEM graduates: who have a sub-bachelor qualification in a non-STEM field.

There are 187,395 young graduates who meet our selection criteria, 46% of whom graduated with a Bachelor's degree or above, and 20% of whom graduated with a qualification in a STEM field of study. For much of our analysis of job upgrading, we use an 'always employed' subset of this group, to focus on those graduates who are engaged in the labour market.

When analysing the relative productivity and wages of graduates, we examine around 10,700 firms per year with five or more employees between 2009 and 2012. These firms collectively employ an average of 620,000 full-time equivalent employees per year.

Our analysis cannot observe students who train overseas, the career outcomes of New Zealand graduates who travel overseas, or graduates who are self-employed or work in the informal sector.

We estimate, using regression methods, how productivity and wage bills vary across different firms within industries, and relate this to the skill composition of their workforces. It should also be noted that the productivity estimates compare firms within the same industry, and will therefore not reflect possible economy-wide influences.

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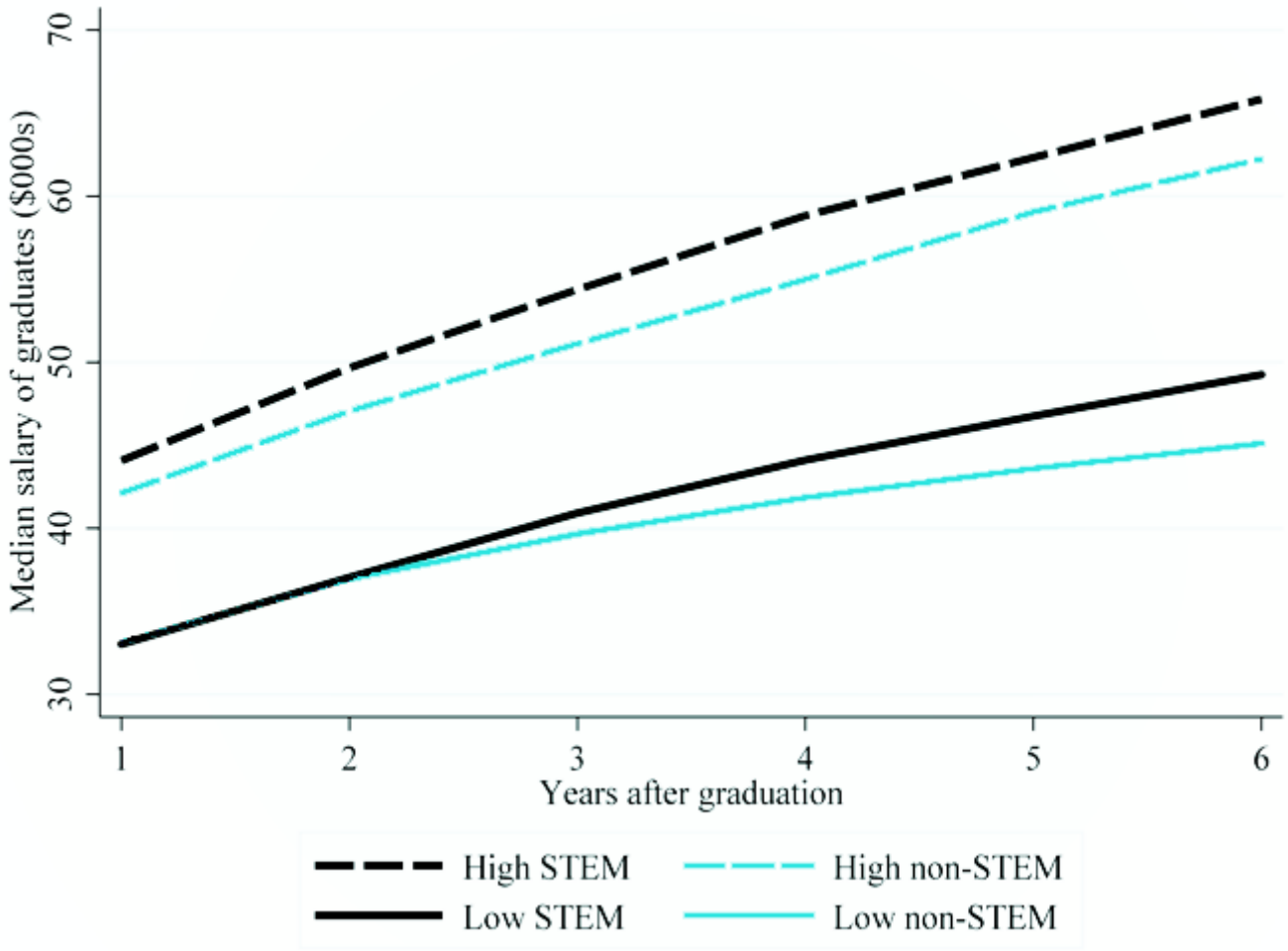
UPGRADING OF JOBS

New Zealand's skilled graduates are very mobile. Many go overseas; in the sixth year after graduation more than 20% of low-STEM graduates are overseas and 40% of high-STEM and high-non-STEM graduates have left New Zealand.

The average high-STEM graduate changes jobs 2.9 times in their first six years after graduation. This is low compared with other groups of recent graduates. The average non-STEM graduate with less than a Bachelor's degree starts 3.9 different jobs.

High-STEM graduates experience relatively rapid earnings growth despite their relatively low number of job changes. High-STEM graduates not only have the highest median earnings rate in the first year after graduation ($45,000), they also have the strongest growth in median earnings over their first six years post-graduation (49%). Among graduates with less than a Bachelor's degree, STEM and non-STEM graduates have similar starting rates ($33,000) but earnings grow more strongly for STEM graduates (49%) than for non-STEM graduates (36%).

Figure 1: Change in Median Earnings



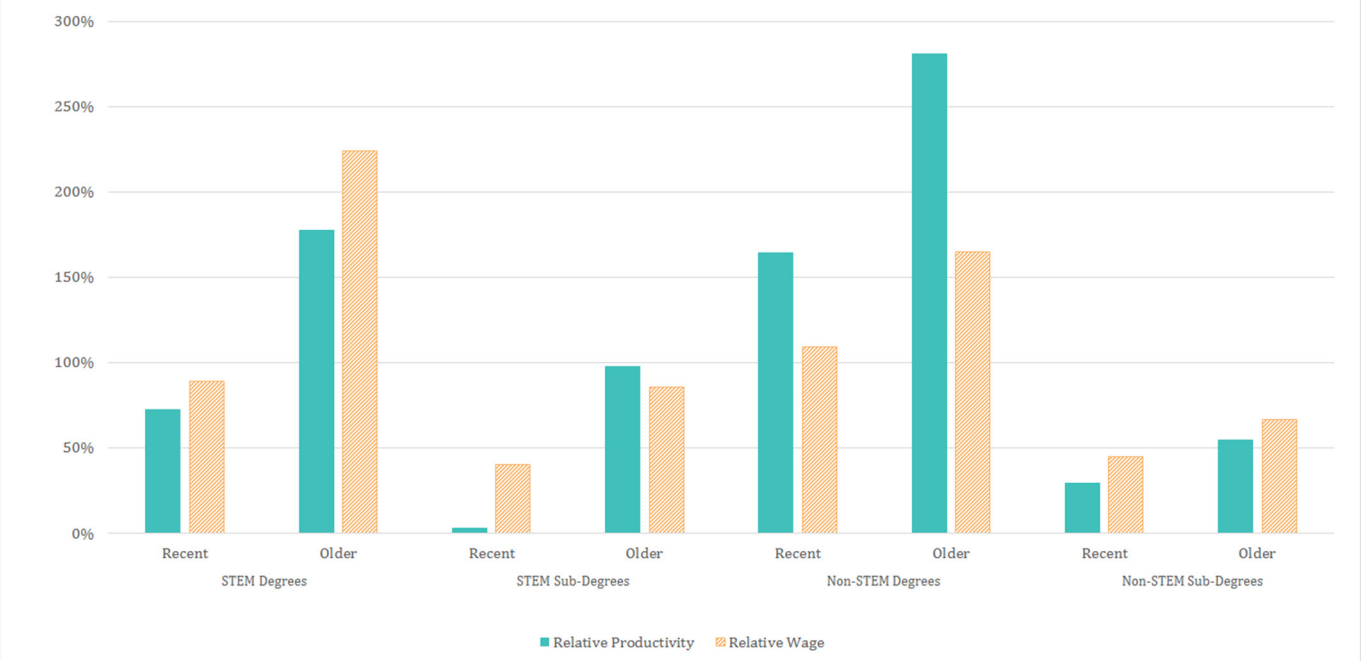
All graduate groups move, in their first six years after graduation, to firms that generally pay more to all employees, with about half of the gains made between the first and second year of employment. The gains over six years are highest for STEM graduates.

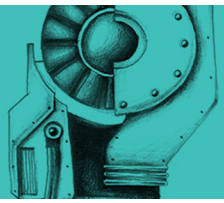
For all graduate groups, Auckland has a higher share of graduates 6 years after graduation than the share that studied in Auckland. This reallocation is weakest for low non-STEM graduates

PRODUCTIVITY-WAGE GAPS FOR GRADUATES

Employees identified as high-STEM graduates account for 0.9% of the workforce we studied, with a further 1.5% from sub-degree STEM graduates. Non-STEM graduates account for a larger proportion, contributing 7% overall, with 2.5% from high-level graduates, and 4.6% from sub-degree graduates. These low numbers are because we have consistent qualifications data only for employees who graduated in the six years prior to employment.

Figure 2: Relative Productivity and Relative Wages of Graduates





The relative productivity of recent high STEM graduates (72%) is lower than their estimated relative wage, though the difference is not statistically different from zero. In contrast, the productive contribution of recent high non-STEM graduates (165%) is 34% higher than their relative wage. All percentages are worked out from the base group, which includes workers who did not graduate from study in the last six years.

The estimates for older (3-6 years post-graduation) graduates with a Bachelor's degree or above show a marked rise in both relative wages and relative productivity contributions compared with more recent graduates. For high STEM graduates, relative wages more than double, and rise well above those of the base category (224%), accompanied by a slightly smaller increase in relative productivity (177%). Together these estimates imply that the wages of older high STEM graduates are 26% higher than their productivity contribution. In contrast, the relative wages of high non-STEM graduates grow less slowly than their relative productivity, magnifying the degree to which their relative productivity (281%) exceeds their relative wage (165%). Three to six years after graduation, wages for this group are 41% lower than their productivity contribution.

The relative wage and productivity contributions of sub-degree graduates are consistently lower than the contributions of degree graduates. Sub-degree graduates in larger firms are estimated to contribute close to zero to productivity initially. For sub-degree STEM graduates 3-6 years after graduation, both wages and productivity have risen to about the same as that of the base group, with a relatively small (12%) wage deficit. The estimated relative productivity of low non-STEM graduates remains close to zero even 3-6 years after graduation, although wages increase to around 67% of the base group.

A gap between relative wage and relative productivity could reflect a range of labour market factors, including discrimination or longer term contracts.

CONCLUSIONS

Recent graduates tend to have relatively high starting wages in the first year or two after graduation. They also tend to move into higher paying firms and industries and larger firms, as their careers progress. STEM graduates with a Bachelor's degree or above change jobs less than other graduate groups, but are more likely to end up in high paying industries, high paying firms within industries, and larger firms.

Degree-qualified graduates become markedly more productive between the first three years after graduation and the subsequent three years. Realtime wages more than double for STEM graduates, and rise by around 50% for non-STEM graduates.

The relative wage paid to high STEM graduates is around 25% higher than their contribution to productivity. In contrast, high non-STEM graduates are estimated to make a higher relative contribution to productivity, and their relative wage is lower than their relative productivity by around 34 to 41%. In larger firms, there is not such a gap between wages and productivity contributions of high STEM graduates.

The analysis of job upgrading and wage-productivity gaps suggest that the level of qualification tells us more about graduate outcomes than the field of study. The broad comparison of STEM fields with non-STEM fields almost certainly conceals considerable variation within each group.

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