

[Output Costs of Education and Skill Mismatch](#)

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Education and skill mismatch refers to the workers employed in occupations that typically require different education or skills. In labour statistics and policy circles, workers are classified as over- or under-employed, depending on whether their education or skill is below or above the occupation average requirement. The OECD reports that, on average across advanced economies, 25% (18%) of workers are under-employed and 22% (7%) are over-employed vis-a-vis their education (skill).

Despite representing such a large proportion of the work force, and despite the policy effort, we still lack a text-book model of under- and over-employment and quantitative estimates of the costs of mismatch. The paper aims at filling these gaps: we propose a simple macroeconomic model of mismatch and provide model-based cross-country estimates of its cost in terms of output.

The theory is based on four features. First, individuals of high and low type are endowed with one unit of indivisible labour. Second, a representative firm has jobs which differ on their skill requirements. Individuals of high type are able to perform skilled jobs but also unskilled jobs, with perhaps higher efficiency than workers of low type. Conversely, only a fraction of low-type workers can perform the skilled jobs, albeit with lower efficiency than high-type workers. Third, individuals have a different "non-pecuniary" value over these jobs, and optimally sort across them. Fourth, each worker is paid its marginal productivity. This simple variation of a Roy model is sufficient to generate a labour market allocation with both endogenous under- and over-employment.

We calibrate the model to 17 OECD economies, based on data from the Survey of Adult Skills (PIAAC). The model is very general and fairly parsimonious. We calibrate two different versions of the model to fit empirical measures of either education or skill mismatch. Five structural parameters can be obtained by solving a simple algorithm to match five key moments, including over- and under-employment, and relative wages of well-matched and mismatched workers.

We use the model to quantify the output costs of education and skill mismatch. Eliminating education mismatch completely would raise output by 2.5% on average, with large cross-country differences ranging from -1.5 to 7% of output. Eliminating skill mismatch would raise output on average by 3.2%, ranging from -0.7 to 9% of output across countries. The key variable that explains the output cost of mismatch is not the percentage of mismatched workers, but their wage relative to well-matched workers. In particular, our paper suggests that the policy maker should pay attention to the wage loss of an under-employed college graduate/skilled worker with respect to her well-matched counterpart. Countries with sizeable "wage costs of under-employment" suffer from a scarcity of college/skilled-

workers in skilled jobs; thereby they would significantly increase output if they were able to successfully reduce mismatch. Based on regressions with simulated data, a 10 percentage point higher "wage costs of under-employment" is associated with a 1 percentage point higher output cost of mismatch.

Our model suggests that mismatch has a sizeable impact on relative wages in the economy. The removal of education mismatch would lead to a lower college premium, but this is not the case with skill mismatch.