Economics and Policy of Innovation

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Dr Claudio Cozza

DEAMS – University of Trieste

Innovation and Employment (Chapter 21)

The relation between Innovation and Employment

- Different approaches, different views:
  - Growth theories (innovation is exogenous)
  - New growth theories (innovation becomes endogenous)
  - Labour economists (technology is one of the various explanatory factors)
- These are all 'equilibrium' theories → all output finds its demand, all workers accepting current wages will find a job.
- Technology is just the shift in the production function.

The relation between Innovation and Employment (2)

- Other approaches have a 'disequilibrium' view of the economy → innovation is a major reason of this continuous disequilibrium, as it shapes competition within and across industries.
- The impact on employment implies that in some industries/areas, jobs are lost while in others there are positive net job effects.
- At the firm level, innovative firms will employ more workers, giving them better conditions (in terms of wage, but not only).

The relation between Innovation and Employment (3)

- Theories are well synthesised – especially with regards to the different 'research questions' – in Table 21.1.
- Then Box 21.1 recalls some 'classical economists' issues we have already studies:
  - Division of labour (but also labour-saving effects) in Adam Smith
  - Machineries and compensation effects in David Ricardo
  - The negative effects on jobs and working conditions in Karl Marx

The relation between Innovation and Employment (4)

- "*I have before observed, too, that the increase of net incomes, estimated in commodities, which is always the consequence of improved machinery, will lead to new saving and accumulation*" (Ricardo, Princ. Ec., 1821);

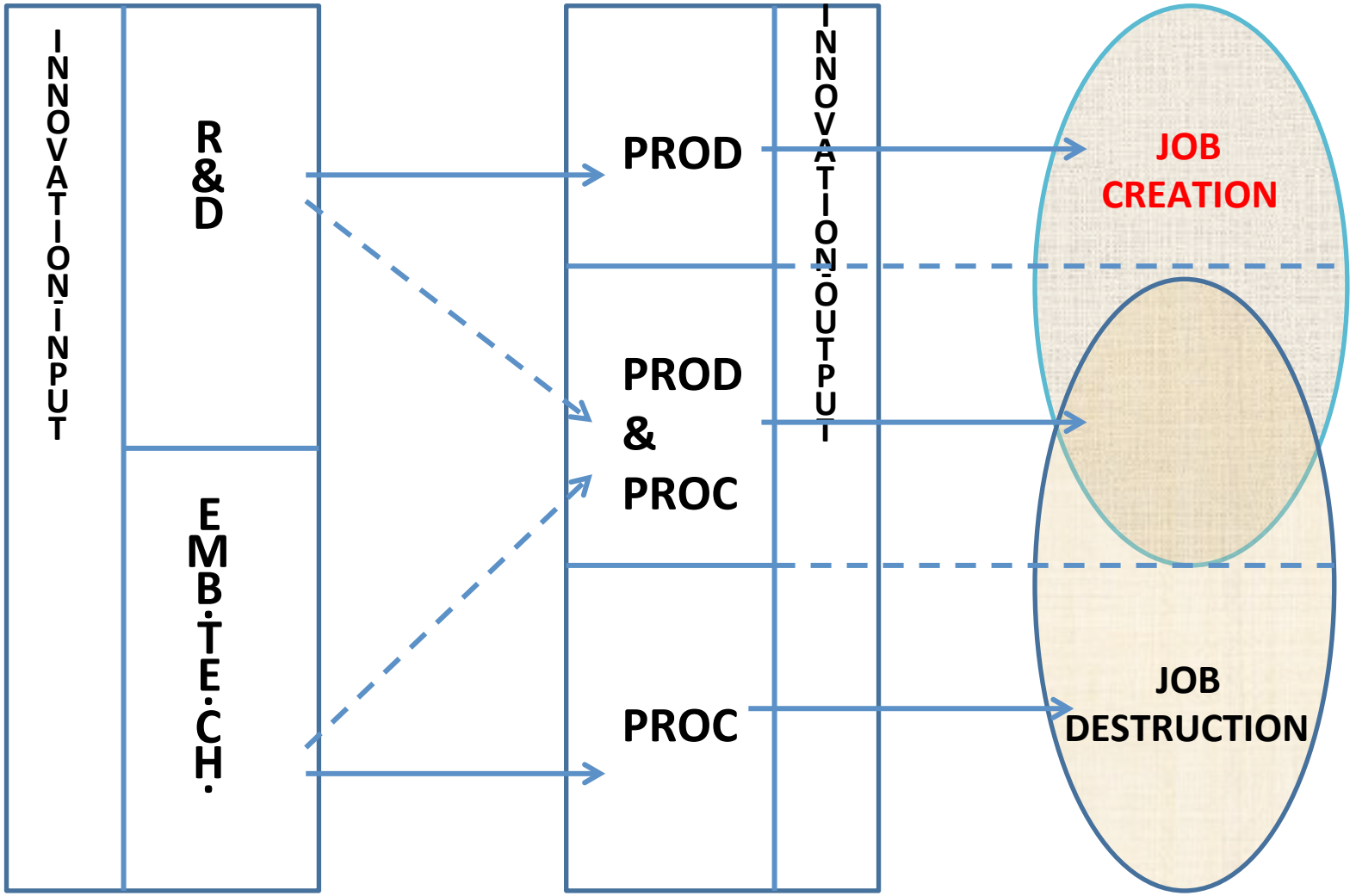
HOWEVER:

- "*The accumulation of capital, though originally appearing as its quantitative extension only, is effected, as we have seen, under a progressive qualitative change in its composition, under a constant increase of its constant, at the expense of its variable constituent*." (Marx, Capital, vol. 1, 1867).

The relation between Innovation and Employment (5)

- Joseph Schumpeter starts his analysis using one of the outcomes of Marxian theory: capital accumulation leads to a constant search for new production techniques and new products.
- In Schumpeter's theory, the former is "process innovation", while the latter "product innovation".
- This distinction is more and more useful to disentangle the effects of innovation on employment in recent theories.

The relation between Innovation and Employment (6)

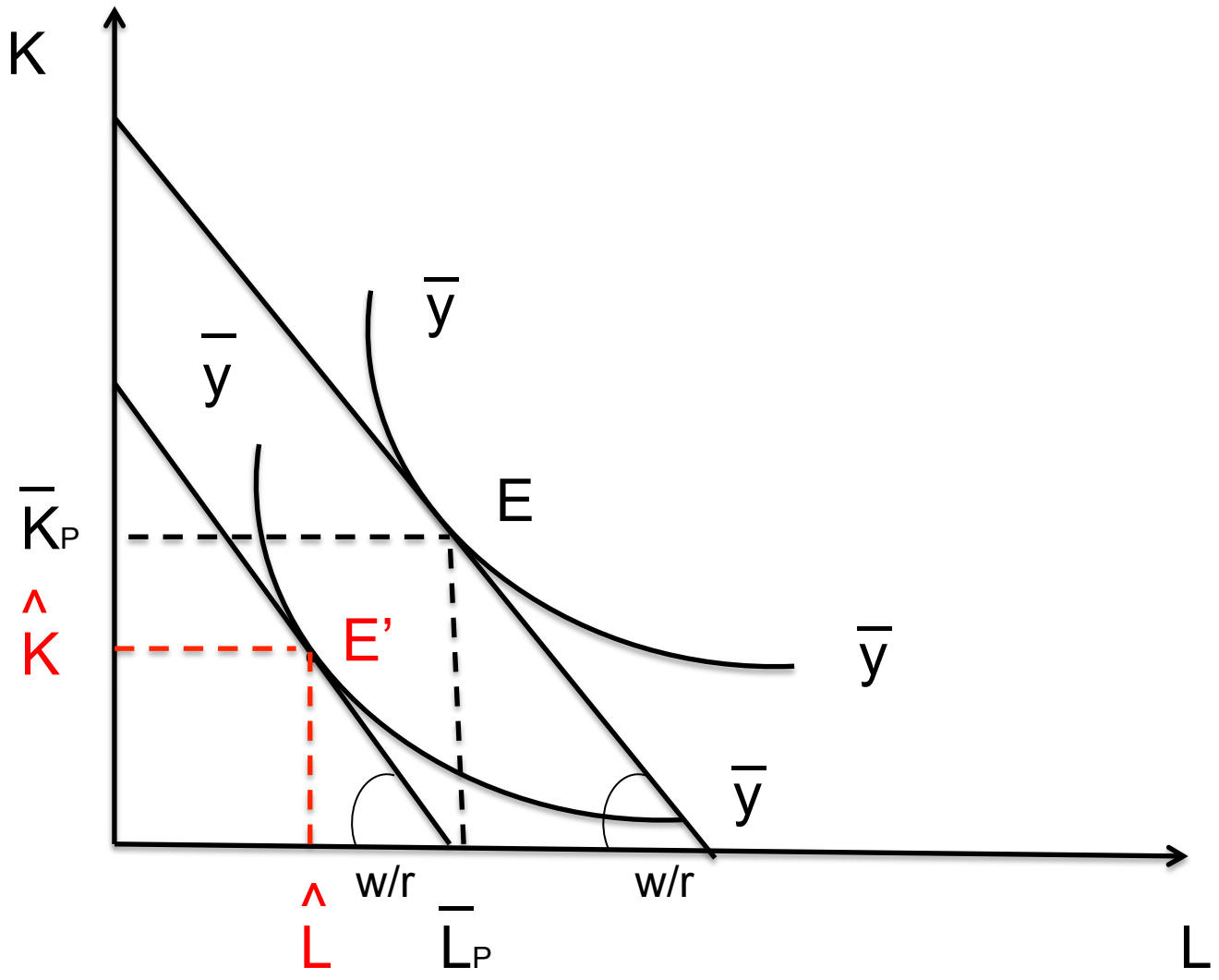


The impact of Innovation on Employment

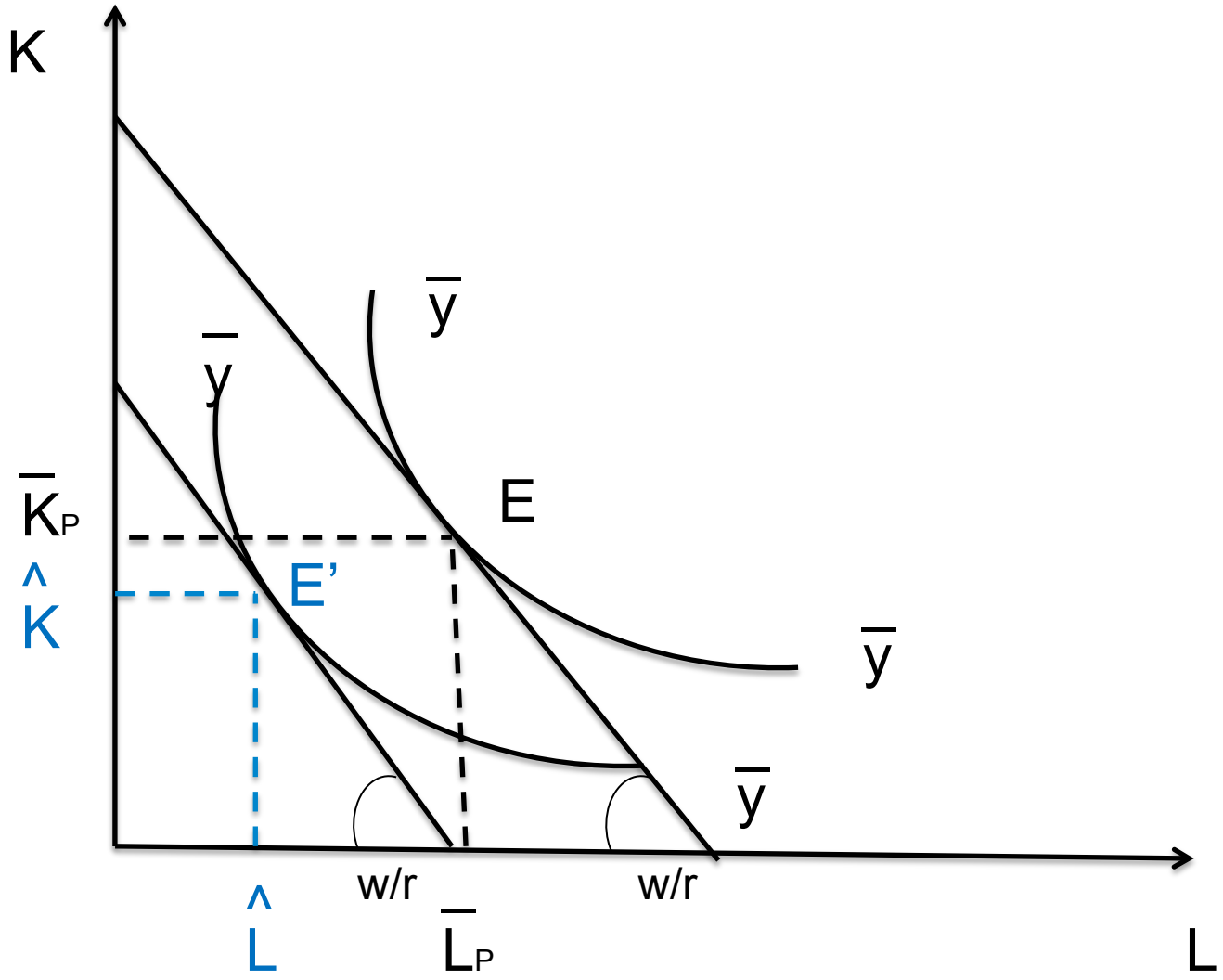
Current (and more relevant) theories focus on the following effects:

- Impact of innovation on the quantity of employment (number of jobs and/or total hours of work); it can be represented by:
  - Direct effects at the firm level (21.3.1)
  - Effects at the industry level (21.3.2)
  - Direct and indirect effects at the macroeconomic level (21.3.3)
- Impact on the quality of employment (21.4)

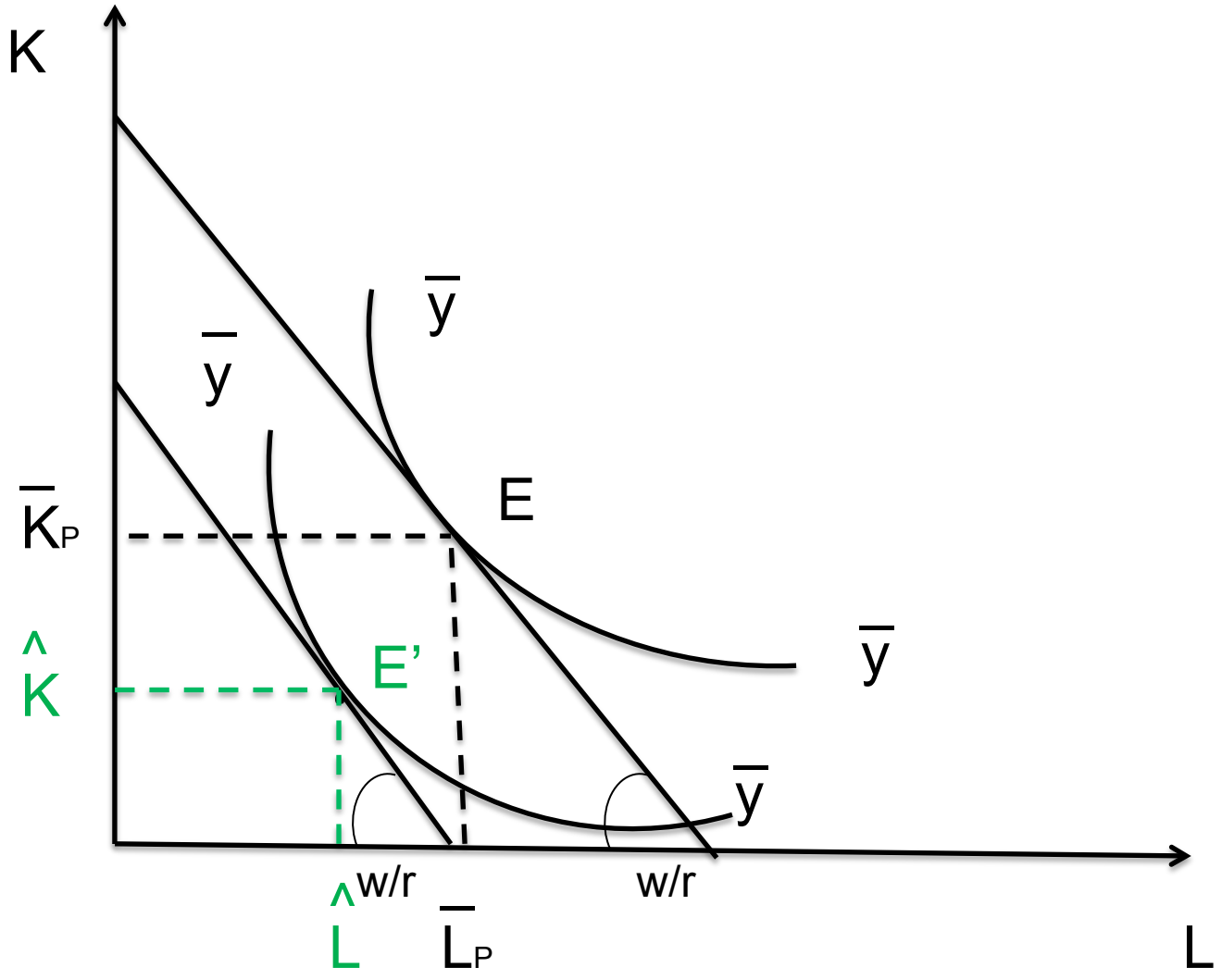
THE DIRECT EFFECT OF PROCESS INNOVATION



LABOUR-SAVING INNOVATION



CAPITAL-SAVING INNOVATION



The impact of Innovation on Employment (2)

However, as stated at page 576, “firm-level studies are unable to point out whether outcome and jobs gains of innovative firms are achieved at the expenses of competitors”.

Is there a net effect or just a redistribution?

Table 21.2 → effects can be very different across countries, sectors and type of innovation. Generically, positive effects appear in high-demand sectors and for product innovations; negative effects are confirmed with process innovations.

The impact of Innovation on Employment (3)

We conclude mentioning some issues related to the "qualitative" effects of innovation on employment.

Theories based on the concept of "Skill-biased Technical Change" imply that the introduction of innovations (especially ICT ones) favour high-skilled workers and damage low-skilled ones.

However, with more complex variables the picture is not 100% clear: see Table 21.3.

Some stylized facts

- Never-ending race innovation / employment
- Technological unemployment can happen
- Type of innovation is key (product/process, but also organisational innovation)
- Change in the “skill bias” of employment
- Macroeconomic conditions are important