

# Spillovers of European regional investment subsidies: Analysis using a forward-looking spatial CGE model

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Subsidising investment in lagging regions is the most important regional policy instrument, both in the EU as well as within European countries. Some argue that this instrument is not specific enough to concentrate the aid towards the regions that are lagging behind most, because the benefits trickle down to other places and little is left to the regions to be supported themselves<sup>1</sup>. There are potentially two channels that could transmit the benefits to places that were not intended to be supported in the first place: trade and the capital market. Through the trade channel the demand impulse generated by a subsidy partly spreads out to the rest of the world. The capital market channel first implies that an investment subsidy raises capital income. Under the assumption of mobile financial capital this makes capital owners better off everywhere, not just in the region to be supported. If capital ownership is concentrated in relatively rich regions, it's these regions that may reap significant shares. A second repercussion on the capital market comes from the fact that subsidies affect stock prices. They make capital in the supported regions more abundant and thus press its market value down. If people in the supported regions happen to own these capital stocks they suffer from an asset loss. This turns out to be an important mechanism. Eventually the lagging regions might benefit less than if they got the money directly in a lump sum fashion. The policy issue to be answered in this paper is to check under which conditions this statement holds true.

Though the title of the paper focuses on the policy application, an important contribution is also on the methodological side. Investment subsidies are usually handled like subsidies of capital user costs in a static framework. We believe this to be misleading. Net investment is the increase of capital stock per unit of time, and thus a dynamic phenomenon. A dynamic approach is therefore needed to study the impact of investment subsidies in an appropriate way. The present paper studies regional investment subsidies in a multiregional neoclassical dynamic framework. We set up a model with trade in heterogeneous goods, with a perfectly integrated financial capital market and sluggish adjustment of regional capital stocks. Consumers and investors act under perfect foresight. We derive the equilibrium system, show how to solve it, and simulate regional policies in a computational application. We

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<sup>1</sup> Vincent Dupont and Philippe Martin. Subsidies to poor regions and inequalities: some unpleasant arithmetic. *Journal of economic geography*, 6:223-240, 2006.

compare the welfare gain generated by an investment subsidy with a hypothetical welfare gain that households would obtain if they got the subsidy as a lump sum transfer.

The model used is a dynamic spatial computable general equilibrium (DSpCGE) model<sup>2</sup> for a closed system of regions. The specification of the production and household sectors as well as of the goods markets is close to an earlier static static model of ours<sup>3</sup> that recently has been widely applied under the brand name *CGEurope* in transport policy evaluation<sup>4</sup>. The special features of the model relate to representation of spatial interactions through explicit incorporation of trade and transport costs and by an assumption of monopolistic competition and “love for variety” in the tradables sector (known from the new economic geography literature).

We borrow from the “old” growth theory the assumption of an exogenous Harrod neutral technical progress with rate  $\xi$ . But the real growth is faster in this model than the rate of Harrod neutral technical progress, unlike the standard Solow model, where both are the same. The deviation is due to the fact that in our model there is an aggregate economies of scale effect. If the economy grows, product diversity increases, which makes production and investment more productive and consumers more satisfied. The factor amplifying the rate of Harrod neutral technical progress gets larger, if substitution elasticity in the tradables mix gets smaller or the share of tradables in production or consumption and investment gets larger.

Regional policy (the new element in the model) is introduced in the model by assuming that in some regions the government rebates to the investor a certain share of the investment cost. This subsidy is financed by collecting a proportional income tax raised everywhere with a uniform rate. Contrary to the often found proposition in the literature, subsidising investment and subsidising the user cost of capital is not the same. The impact is very different. The main point is that subsidising the user cost of capital favours both, owners of the existing stock as well as asset owners everywhere in the world earning a higher interest on their asset. Subsidising investment potentially may harm rather than benefit owners of the existing stock. The stock becomes less scarce, when investments get cheaper and thus its market value drops. If the subsidy is small in comparison to the world stock of assets such that its impact on the world real interest rate is negligible, the loss of stock value dominates.

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<sup>2</sup> J. Bröcker, A. Korzhenevych, Forward looking dynamics in spatial CGE modelling, *Economic Modelling*, 31:389-400, 2013.

<sup>3</sup> J. Bröcker. How would an EU-membership of the Visegrad countries affect Europe's economic geography? *Annals of Regional Science*, 32:91-114, 1998.

<sup>4</sup> J. Bröcker, A. Korzhenevych, and C. Schürmann. Assessing spatial equity and efficiency impacts of transport infrastructure projects. *Transportation Research B*, 44: 795-811, 2010.

Regarding the impact on complementary factors (labour) both types of subsidy push the factor price in the same direction.

The model is calibrated to a system of European regions (NUTS2 scale). DG Regio and DG JRC data on the actual amount of investment subsidies received via the Structural Funds in the period 2007-2015 is used to calibrate the subsidy rates. Three simulations are performed, focusing on the regions in Spain, Poland, and Bulgaria + Romania, respectively.

The initial amount of assets (value of owned capital stock) belonging to the households in each region is calibrated using the national accounts and international trade data. However, the exact composition of asset portfolios for each region is not possible to calibrate. Our approach is to present results for the two extreme scenarios.

The simulation results for each case thus show two different scenarios with dramatically different outcomes, labelled “global portfolio” and “local portfolio”. “Global portfolio” means that portfolio compositions of all households are identical. Thus, each household owns a perfectly diversified portfolio (equal share of each region in the portfolio). Actually the assets are positive at all times in both our scenarios. The perfectly diversified portfolio is the best one to be held by risk-averse individuals, if future shocks are unpredictable, but it is likely not what we would observe in practice. “Local portfolio” is the other extreme, where households exclusively own the capital stock of the region they live in, and nothing elsewhere.

The interesting observation is that under conditions of a global scenario there is a subsidy multiplier that is considerably larger than one, while under conditions of a local portfolio there are obviously spill-overs to the rest of the world. The mechanism is the following. The subsidy lets the market value of capital drop. This is a strong effect that matters in quantitative terms. It is important here to distinguish investment subsidies from subsidising user costs of capital. The latter benefit all capital owners, those owning the existing stock as well as those investing in new stocks. The former benefits only investors but harm owners of existing stock who in a way are facing new competition. While regional workers own the complementary factor, capital owners own a competing factor, which becomes more abundant due to lower cost of investment.