
R_4: ,How to travel from Brussels (EU) to Paris (COP-21)? or ,Why the Economics of external shocks (Covid-19, Loss of Species, Global Warming) is different?,

The 2008 prime crisis or the 2015 Euro crisis have been endogenous shocks to our economy. They are caused by specific actors and remained limited to some sectors of the economy. In this sense they are endogenous or internal shocks. Pandemics (like Covid-19), the on ongoing loss of species and natural habitats and the impact of global warming are different. They are rather external shocks that hit and will hit our society. External shocks are different in nature and require a different economic, fiscal and monetary response. External shocks are characterized as systemic and global, they hit our society in an asymmetric and unfair way. Such external shocks are the result of negative ecological and social spillovers and externalities and they are significantly disruptive. Meaning, instead of adjusting and optimizing the given regulation, they require a change of the sets of the rules of the game.

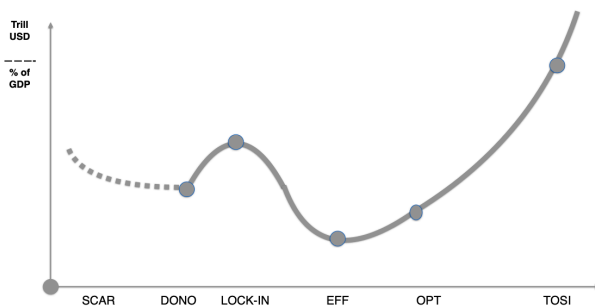
Calculating the total costs (TC) of such asymmetric shocks requires always a multi tier approach: the direct costs of the shock (SC) itself; the costs of managing the shock (MS); the costs of preventing future shocks (PC); further the costs of collaterals due to the mitigation of the shock (CC) and finally costs associated for education, learning and shifting our mind set (CM). This multiple tier costs add. If we do nothing against a shock, societies have to bear the entire impact of SC. If we start managing the shock (SM), we create additional costs (MS+PC+CC+CM), but reduce the costs of the shock itself (PC). And if we prioritise the shock and neglect all other problems, the collateral opportunity costs (CC) will soar.

$$TC= SC+MS+PC+CC+CM$$

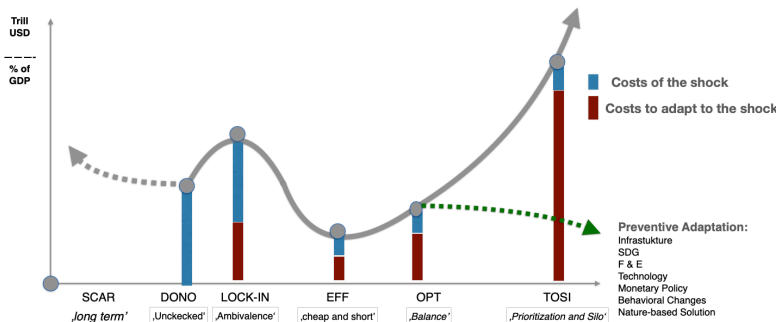
Take global warming: The costs of inaction (SC) are considered to be 4-40 Trill USD cumulative until 2100. Assuming that the global GDP is tripling until 2100 from 80 Trill USD as of today to 240 Trill USD in 2100, we have to consider a cumulative loss in income over 80 years of 2-5%. Meaning instead of increasing our income by 300% we only increase is by 295%. This is the amount of money we have to consider, if we do *not* adapt. That is a lot of money, but not the end of the world, the end of civilization or the end of the human species. If we prioritise in the wrong way and put most of the money in managing global warming (MS), we are creating huge crowding out effects and opportunity costs along the way until 2100: On the job market alone, we would create millions of jobs to put solar panel on our roofs, but do not train medical doctors, social workers, nurses and teachers instead. We should do different. If we start adapting in a more intelligent manner, we will increase welfare and wellbeing and protect the environment at the same time.

The costs of external asymmetric shocks follow a W or J curve (left graph), the total costs, including additional wise adaptation follows the dotted curve (right graph), which would include R&D, infrastructure projects (dams), migration, collective life style changes (riding a bike, eating veggie burgers), new technologies (geo-engineering, CCS), taxation (Co2), early warning system, education, new monetary policy (a dual currency regime). BAU represent a non adaptiv response; OPT the cheapest way to consider all potential costs in wiser way; MAX prioritizing towards the shock alone, while leaving all other challenges unchecked.

Economics of external shocks: ,W'-Curve



Economics of external shocks: ,W'-Curve



In order to travel from Brussels (EU) to Paris (COP 21) we should focus on the total costs and wise adaptations following the right graph. In the left graph we prioritize global warming, but maximize the costs at the same time. To Note: The costs of external shocks are mainly opportunity costs, *reflecting the unfulfilled needs and unchecked risks of projects we have not realized because we decided to put our money somewhere else.* This is particularly relevant because these costs do not

disappear, but feed back onto our balance sheets as additional indirect, variable costs or the like. This means that opportunity costs are not only theoretical or hypothetical costs, but real costs.

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