TRADE AND ECONOMIC EFFECTS OF POLICY MEASURES TAKEN IN RESPONSE TO THE ECONOMIC CRISIS

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Abstract

This paper uses stylized GTAP simulations to analyze the trade- and income effects of different policy measures taken in 2008/09 in response to the economic crisis. The analysis concentrates on behind-the-border measures that are part of massive fiscal stimulus packages, but also looks into direct trade policy instruments. The paper presents a taxonomy of measures according to there first point of incidenc and carries out a number of stylized simulations to trace their trade- and income effects. Some new border measures in the wake of the crisis are reported by the WTO, but they cover at most 1 per cent of pre-crisis trade levels and they have not been major elements in the policy response. Trade effects of behind-the border measures are of more concern, but evidently less visible than border measures.When designing the economic stimulus packages trade effects may not have been amongst the primary concerns of policy makers, but some aspects of these packages are more trade-friendly than others, and they have potentially more structural impacts.

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1. Introduction

This paper uses a set of stylized model simulations to assess the trade- and economic effects of different policy measures taken in response to the economic crisis. The crisis and the measures taken in response to it are too recent to allow an ex-post empirical assessment. Economic statistics are produced with some lag and the full effect of the measures on the economy will take time to become apparent. The current volatility of markets is an additional complicating factor that obstructs a clear view of the essential cause-and-effect relationships. Those considerations motivate the use of an economic model which can isolate the relevant changes in the economic and policy environment and which can be used to ask 'what-if' questions.

The analysis focuses on the static economic efficiency of policies, using mainly national income and trade as indicators. The analysis uses the static GTAP model that does not allow the analysis of dynamic growth effects. Such dynamic and long-term effects may be particularly relevant for responses to the crisis that include public investments in infrastructure. See, for example, McKibbin and Stoeckel (2009) for a dynamic macro-economic analysis. The model is also not suited for a fully fledged fiscal-policy analysis which would allow the long-term consequences of running temporary fiscal deficits to be studied. These shortcomings of the method employed are fully acknowledged and should be kept in mind when interpreting the results. But it should also be acknowledged that economic science has not yet reached a consensus on integrating sector-specific analysis (focusing on structural change) with dynamic macro-economic issues (focusing on balanced growth) for a variety of technical and theoretical reasons.

The model is used to simulate a wide range policy measures that are observed in response to the crisis. These range from economy wide demand side stimulus to sector specific subsidies implemented by a representative subset of economies: the EU25, USA, Japan and China. Border measures, both on the importing side and on exports are also analyzed. In each case, the effects on the economy taking the measure (own) and the effects on other economies are analyzed, with the aim of highlighting cross—country spillover effects from unilateral policies. The model results are also used to analyze the incentives to coordinate multilaterally amongst countries, and to investigate the incentives to retaliate through border protection for (low-income) countries that do not or cannot participate in coordinated stimulus packages.

The analysis highlights the need to properly target policy measures. If the problem is a shortfall in demand, as is the case in the current economic crisis, demand-side measures are a more appropriate response than supply-side measures. But the specific design characteristics of demand-side measures determine their effectiveness in terms of their impact on GDP and on trade. The analysis finds that policies that bias demand towards specific sectors, and those that are biased towards domestic products are inferior to those that are more generic in design. Sectorally specific supply-side measures are found to yield overwhelmingly negative effects on the own economy, through maintaining or creating inefficiencies, and they yield negative spillovers on partner countries, through lowering production costs in one country relative to the world market.

2. Crisis measures

There is a whole set of possible policy responses that, by definition, are negative for trade because by design and intent they restrict or distort trade or increase trade costs. Increases in tariffs, import bans, and quantitative restrictions on imports or exports all fall into this category. So also do behind the border measures that explicitly discriminate against foreign goods or foreign firms. There is another set of

measures that are difficult to evaluate. In the absence of a crisis such as the world has recently experienced they would be judged as distorting, but in the current environment, can be interpreted as correcting for a market failure. Provision of short term trade finance by export credit agencies is an example. But even this type of measure, if left in place too long, may crowd out market measures and constitute a distorting subsidy.

This section provides a brief overview of the crisis measures taken, without delving into their potential effects on trade. The section, and the subsequent model simulation, use a typology that first divides measures into those with a direct impact on trade, and those that impact trade indirectly. The latter measures are divided into supply and demand side measures, which are then further divided into measures that are generic or economy-wide and those that are sector-specific.

The category of measures that impact trade directly includes all classical trade policy instruments ranging from tariffs, to trade remedies (safeguards, anti-dumping), export restrictions or distorting incentives (subsidies), quantitative non-tariff barriers (quotas, bans, licensing) and other regulations that increase trade costs. On the other hand, the category of measures with an indirect bearing on trade includes: (i) Supply side measures which can broadly speaking target factors of production (capital, labour, intermediate goods and services), the fiscal burden on firm's operations (corporate taxation) as well as firms' access to credit, and (ii) Demand side measures which target consumers and may be delivered in the form of tax reductions, direct grants (lump sum payments) or increases in social security spending. Increases in government expenditure involve adjustment of public rather than private demand, and therefore are also included in the category of demand side measures.

Several international organisations report on recovery measures taken by governments during the period September 2008 through to August 2009. Here we draw on the following sources of information for the measures are: World Trade Organisation (WTO): Two reports (26/03 and 01/07) from the Director General on the Financial Crisis and Trade-related Developments, covering the period September 2008-June 2009. One report Annual Report on the TPBR Trade-related developments during the twelve months from October 2008-October 2009; OECD, WTO, UNCTAD: Report on G20 Trade and Investment measures covering the period until August 2009; European Commission: Report assessing progress with the European Economic Recovery Plan, covering the period December 2008 - May 2009; International Labour Organisation (ILO): Report on the work response to the crisis; United Nations Conference on Trade and Development (UNCTAD): Report on Investment Policy Developments in G20 countries, covering the period October 2008-June 2009; Centre for Economic Policy Research (CEPR): The Global Trade Alert Report; the OECD Economic Outlook and several OECD internal reports.

Measure directly affecting trade

In its July 2009 report, the WTO Secretariat notes that, in contrast to the number of measures observed during the same period in 2008, "the number of new trade-restricting or distorting measures announced or implemented since 1 March 2009 exceeds the number of new trade-liberalizing or facilitating measures by a factor of more than two". The measures have, principally, been introduced in specific sectors, and very rarely have general applicability. In most cases restrictions also target products from specific sources. Overall, the at most one percent of trade flows has been affected by new trade measures, according to WTO (2009c)

There are examples of both restricting and opening measures in all the major sectors of economic activity. A closer look at the number of policy initiatives shows, however, that their frequency has been significantly higher in sectors such as agro-industries, metal and chemical industries. With the exception of

trade in chemicals, these are sectors that were already subject to high trade barriers in the pre-crisis period.[1] Measures were also recorded in the automotive industry, and in textiles. These are worrying developments as they exacerbate distortions in sectors already subject to tariff peaks. Trade in services has been a lot less affected by the crisis for two reasons (Borchert and Mattoo, 2009): demand for a range of traded services is less cyclical, and services trade and production are less dependent on external finance. Consequently, measures in those sectors were rare and mostly in the direction of further liberalizing rather than restricting trade.

A significant number of non-tariff measures were activated to restrict trade, such as the introduction of licensing requirements, safeguard measures, and anti-dumping investigations. Bown (2009b) reports that while the number of antidumping cases in 2009 has leveled off after the initial escalation associated with the crisis in 2008, the use of safeguards spiked more recently. It is worth noting that developing countries accounted for almost 80% of all anti-dumping initiations for the period October 2008-October 2009, which mainly targeted other developing countries (see WTO, 2009c).

Some types of trade-policy instruments have been used very little during the crisis. New export restrictions were introduced in China (for bauxite, coke, magnesium, zinc and silicon metal, among others)[2]. New quotas on imports or exports were applied in Canada and Russia (milk protein substances, meat, poultry and pork), while Switzerland eliminated a similar provision for milk. New licensing and registration requirements have only been recorded in Indonesia (for food and beverages, electronics, footwear and garments).

Despite the increasing use of those instruments, the amount of imports targeted by all new measures thus far is relatively small. With the exception of India, country-by-country estimates indicate that the new protectionism thus far covers only 0.2% to 0.8% of the total pre-crisis (2007) level of imports (Bown, 2009a). These rough estimates were confirmed by the WTO in its latest monitoring report (2009c) where the share of the value of trade covered by new trade-inhibiting measures was evaluated at a maximum level of one percent of total world imports. Higher shares of affected imports are observed in the agriculture sector as well as in the basic metal industries. The share of those sectors in total affected import values reaches 36 and 29 percent respectively. The gap between estimates for those particular sectors and the rest is large, confirming that trade policy during the crisis has had very specific targets, following patterns already observed in the past.

The new trade-facilitating initiatives do not follow clear sectoral patterns in the same way as observed for trade-restricting measures. It is nevertheless noteworthy that major *developing or emerging* economies have been more active in implementing such measures. Only Canada, Australia and Mexico among the OECD countries have adopted a broad policy to reduce tariffs. In India and China tariffs and export duties were reduced widely as part of packages of measures adopted to facilitate trade. It is important to underscore however that those measures were taken along with many others of a restrictive nature. Whether openness of the economy as a whole was reinforced in those countries will only be able to be assessed in the future; that is, when comparisons to pre-crisis levels of trade flows become again meaningful.

Due to the financial nature of the current crisis, trade finance has also received attention during the design of the latest trade policies. Measures aiming to facilitate access to export credit were taken in many economies, such as in Brazil, the European Union, and India. Following the April 2009 G20 meeting, where a $250 billion pledge was adopted in the area of short term trade finance, 36 countries agreed at the

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[1] Impediments to trade in chemicals concern mostly technical barriers to trade such as standards and regulations. Protectionism is not the dominant explanation for barriers in the sector.

[2] The United States, the European Union and other countries filed official complaints against China at the WTO.

OECD to worldwide export credit support to help boost international trade and investment. It is noteworthy that most countries have also implemented measures to facilitate the flow of credit to firms in difficulty, regardless of the international character of their operations.Those measures could also have filled a need related to trade.

Measures with an indirect bearing on trade

Measures taken behind the borders are generally intended to stimulate demand, ease the pressure on the supply side of the economy, and provide emergency injections to financial and other sectors at risk. This type of economic policy response would seem a priori, to have been more important than the use of trade instruments; hence we could expect also that significant implications for trade and for the international trading system may be found mainly in an exploration of these measures.

A number of industries have been the particular focus of support measures, both on the supply and demand sides, among them the automobile industry was one of the hardest hit by the recession. Support has included subsidies, including for short time working, and direct involvement in industry restructuring plans, and, on the demand side, car scrapping schemes. Very few of the demand side schemes has been found to discriminate against foreign produced cars but there have been reports, difficult to substantiate, but persistent, that informal pressure has been brought to bear in some cases to persuade firms receiving government assistance to favour domestic investment and employment over foreign subsidiaries.

Virtually all countries' stimulus packages have included substantial infrastructure components. For most countries planned expenditure is less than 1% of GDP but for China, Mexico and Poland it is larger – more than 5% in the case of China. Public investment in infrastructure is a significant share of the stimulus packages in many countries, ranging from as high as almost 40% in China and Poland, to around a quarter in Denmark, Spain, France, Italy, and Turkey and around 10% or more in the US, Sweden, Netherlands, Austria and Australia.

Typical fiscal packages adopted by member countries have included a large volume of tax cuts, with tax measures amounting to about two percentage points of GDP. There is a large degree of heterogeneity, however. Tax cuts of more than 2½ per cent of GDP were adopted by Australia, Canada, Denmark, Iceland, Spain, Sweden and the United States, who made their largest cuts to income taxation, while Hungary and Ireland were forced to consolidate and *raise* income taxes substantially. Estimates from the cyclically adjusted series in the OECD *Economic Outlook* database imply median falls in tax revenues across the OECD of 1.2% of GDP in 2009 and 1.5% in 2010, including the estimated effects of automatic stabilisers.

Almost all countries have, moreover, intervened in the labour market, with measures specifically targeting unemployment, Several countries dramatically increased expenditure on Active Labour Market Programmes (ALMPs), most notably Korea, Japan, Mexico, Poland, Spain and the United Kingdom. These countries all increased their spending by more than 25%, with Spain's expenditure on such programmes reaching over 1% of GDP. Four-fifths of OECD countries have responded to the current crisis by introducing or expanding short-time working schemes which aim to reduce the labour costs of companies while avoiding making workers redundant. Virtually all OECD countries have made some efforts to expand and/or strengthen training, despite concerns about the feasibility of scaling up such programmes too quickly.

3. The model used

The model used in this paper, the Global Trade Analysis (GTAP) model is well known and widely used for the analysis of international trade. It is a multi-sector, multi-country general equilibrium model of the world.[3] The version used for this paper differs from the standard GTAP model only with regard to the inclusion of some additional tax instruments to analyze details of the fiscal-stimulus packages. Using a standard model is a deliberate choice: in this way the analysis can relatively easily be replicated by other researchers and the results can be checked.

For this paper the GTAP version 7 database has been aggregated into nine regions: EU25, USA, Japan, Other developed economies, China, India, Sub-Saharan Africa, and Rest of the World.

The aggregation distinguishes nine traded commodities: agriculture and processed food; manufacturing; motor vehicles and parts; other transport equipment; textiles, clothing and footwear; oil and natural gas; natural resources; petroleum and chemical products; and services. Four production factors are distinguished: land, capital, skilled labour and unskilled labour. The model is not very well suited to the evaluation of the impacts of interventions in the financial and banking sectors.

The same database, but with a different aggregation across countries and commodities, and a similar model, has recently been used by Bénassy-Quéré et al. (2000) to help understand the sharp reaction of trade flows to the economic downturn in the Asian financial crisis. Contrary to such a historical 'backcasting' approach, the current analysis uses the model for a set of stylized experiments.

In the main set of simulation experiments only four regions are simulated as engaging in new policies, while the other regions are passive. The EU25, USA, Japan and China are simulated to change their policies, either unilaterally or in a co-ordinated fashion. In one set of simulations the question is asked: what would be the effects if other countries raised import barriers while the four regions implemented a stimulus package?

Rising unemployment in many countries has been a prime motive for countries to provide stimulus packages. To take this reality into account, some of the simulations contrast a full employment situation with a labour market that is characterized by sticky wages and unemployment in both the skilled and unskilled segments of the labour market. While this is perhaps the most relevant baseline in today's world economy, it is equally important to understand the effects of stimulus packages when the economies will have been restored to a full (or almost full) employment situation, and countries will have to exit from the crisis-specific policies.

Unemployment of production factors represents a departure from the general equilibrium theory on which the model used in this report is based, and it is important to note that, absent a fully fledged theory of the labour market, the modelling is very simplified. Unemployment is modelled by fixing real wages for skilled and unskilled labour (nominal wages are still flexible) and letting the level of labour endowment adjust. This amounts to assuming that there is a pool of unemployed labour that has a perfectly elastic supply at the given real wage rate. Since labour supply is perfectly elastic at the given real wage rate, this provides an upper bound to employment effects of the stimulus packages.

Some supply-side measures target the production factor capital while others aim more directly at keeping labour in employment. The effects of such measures depend on the ease with which capital and labour are substitutable for each other. If substitution were not at all possible, they would always move together if

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[3] For more information on the model, the database and the research network see www.gtap.org

output expands. A subsidy to one of the production factors would also tend to lift use of the other production factors. However, if factors are substitutable for each other, a subsidy to, for example, capital would tend to increase the capital-labour ratio. Producers will use relatively more of the relatively cheaper capital and relatively less of the production factor labour. The overall effect on labour employment will depend on whether the capital subsidy is sufficient to boost output enough such that the substitution away from labour is offset by greater overall demand. In order to highlight the importance of the factor substitution effect, some simulations use lower elasticities of substitution (half their original values).

The model simulations do not allow the government budget to be in a permanent deficit. Government expenditures must match government income. Like all other actors in the model (consumers, producers) the government has to satisfy its budget constraint. While this is perhaps not a realistic assumption in the short run, it avoids the artificial creation of 'free lunches'. In the long run, the fiscal stimulus packages will have to be financed. The simulations therefore will show that any increase in government expenditure will have to be balanced, either by lower government expenditure elsewhere in the economy or by increases in tax revenues.

Finally, it should be noted that the numeraire price of the model is an index of global factor prices, and that global savings are distributed over regions to equalize expected returns on investment.

The model focuses on static efficiency of policy changes. It has already been noted that it is not very well suited to assess typical macro-economic mechanisms, including investment behaviour and the fiscal aspect of policy making. At least three further questions should be addressed regarding the choice of the model and benchmark against which simulation results are evaluated. First, whether a static model is suited to analyze essentially cyclical events; second, whether the standard economic assumptions, such as consumer utility maximization under budget constraints and cost minimization by firms, are valid in the current context of economic crisis, and third, whether the baseline of the model simulations should not reflect the disturbed economic situation of the moment.

A static multi-sector model is evidently not suited to address macro-economic cycles. The purpose of the simulations is to trace possible trade and economic effects of policy measures, and it is not attempted to analyze how economic behaviour might change over the course of the cycle. For example, if savings and expenditure behaviour would be different in times of crisis than in normal times, this effect would not be captured endogenously by the model, but could be imposed on the simulations by appropriate changes in parameters. Indeed, one of the simulations reported below goes towards this kind of analysis by increasing the marginal savings propensity of consumers to see if this changes the effects of demand stimulus packages. The CGE model rests on strong assumptions about rational choice behaviour of consumers and firms. Are those assumptions invalid in times of economic crisis? This is hard to answer, and absent alternative, and tested, theories it appears not prudent to resort to different assumptions. Finally, should the correct baseline not be a 'crisis baseline', as opposed to a world economy that is characterized by equilibrium on all markets? Since the model does not contain a financial sector, the relevant divergence from equilibrium that can be addressed is on the markets for factors of production, labour and capital. In order to mimic possible (under-) utilisation of productioon factors this is exactly what some of the model simulations do, concentrating on the labour market. As will be seen below, this divergence from equilibrium assumptions makes an important difference for the assement of the effects of the various measures taken in reposonse to the crisis.

With those qualification in mind, the next section proceeds to discuss the results of a large set of simulations with the model.

4. Simulations and Results

Border measures

The economic effects of border protectionist measures are well understood, and perhaps need less elaboration as compared to measures that have an indirect impact on trade. The benefits of multilateral trade liberalisation have been estimated using large scale applied models, for example OECD (2006a, 2006b) and Francois et al (2005), Anderson et al. (2005), Hertel and Keeney (2005). New protectionist measures mainly occurred in industries that that were already subject to relatively high trade barriers, such as agro-industries, metal industries and textiles. The share of trade covered by new border measures in response to the crisis has been less than one per cent, suggesting a limited economic relevance at this point in time, but use of these instruments could be increased in the future under pressure of persistent unemployment. Indeed, there is no reason for complacency as increasing border protection is potentially very disruptive for the fragile recovery of the world economy. Multilateral coordination to bind and reduce tariffs can limit the potentially large losses to the world economy (Bouet and Laborde (2009)).

On the export side, some new or tightened restrictions on exports of some raw materials were observed, which have clear distortive effects on world markets and that can disrupt the supplies to processing industries in importing countries.

Against this background two sets of stylized border policies are simulated. In the first set, the EU25, USA, Japan and China raise their border protection against all other economies by increasing the wedge between world prices and domestic prices. Using a simple price-wedge captures, in a simplified way, the effects of various types of import measures: tariffs and non-tariff measures raise the price of imported goods relative to domestically produced ones.[4] In order to capture the observed reality that new tariffs and non-tariff measures were mainly observed in a limited number of sectors, they are simulated in only three of the model sectors: agriculture and processed food; manufacturing; textiles.

In the second set of simulations export restrictions on raw materials are simulated in China and the Rest-of-World region. Again this is implemented by a positive price wedge (a tax) between domestic prices and export prices. The model sector that is affected by the export restriction is 'natural resources which is an aggregate of forestry, fishing, coal and minerals.[5]

Selected results are summarized in Table 1 as multiplier effects of the policy change. This indicator of the effectiveness of the policy measures is a dimensionless number that divides the change in the economic variable of interest (exports or GDP) by the money value of the policy change.[6] 'Own effects' are the effects on the country taking a policy measure, assuming that other countries do not take new policy measures. Effects on partners are the spillovers to all other regions in the model. [7]

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[4] Of course tariffs lead to government revenues while non-tariff measures typically do not. For the illustrative purposes of the simulations this difference is not taken into account. Given the size of the simulated tariff increases the additional tariff revenues are not big enough to make a significant difference for the results reported here. A more refined analysis could model the different measures and their revenue effects in greater detail.

[5] If the actual instrument used is an export quota, the price wedge will capture its tax equivalent.

[6] The multiplier indicators relate the change in the variable of interest Z (GDP or trade) to the value of the policy change X (e.g. money value of the price wedge, size of subsidy or tax reduction): $I = \Delta Z / \Delta X$

[7] The decomposition is calculated by the Gempack program indicators.tab, which has been specifically written for this project. This program extracts from the Gempack solutions files relevant subtotals of percent change results, multiplies them by base values and aggregates them to calculate 'own' and 'partner'effects.

Table 1: Multiplier effects of border policies [(1)]

	Trade effects			Income effects		
	Volume of exports			Volume of GDP		
	Own	Partner	World	Own	Partner	World
Import barriers [(2)]	-1.36	-0.80	-2.16	-0.66	-0.07	-0.73
Export restrictions [(3)]	-0.87	-0.20	-1.07	0.05	-1.12	-1.07

Notes: (1) Trade indicators are calculated from the GTAP variable qxwreg, GDP indicators from qgdp. The multiplier divides the change in the variable of interest (exports or GDP) by the money value of the wedge, i.e. the price differential multiplied by the trade flow. (2) Simulated increase of wedge between import prices and world prices by 5% for agriculture and processed food; manufacturing; textiles in EU25, USA, Japan and China. (3) Simulated increase of wedge between domestic prices and export prices for natural resources by 10% in China and Rest of World.

Table 1 shows highly negative effects of increased border protection. On average, one dollar worth of increased price support[8] leads to a 2.16 dollar drop in world exports, and to a 0.73 dollar drop in world income. Of course, an import barrier reduces exports from partner countries, but it also reduces own exports – and even more so. This is an illustration of the famous Lerner symmetry (after the economist Abba Lerner, who published this result in 1936): protecting against imports means ultimately that exports are taxed. Because import barriers raise domestic prices, through higher cost for intermediate inputs and through lifting the general price level for consumer products, export products also become more expensive and lose market share in the face of international competition. While the sectors being shielded behind higher import barriers may benefit from increased prices, overall domestic production in the economy implementing an import barrier will contract and it will use its resources less efficiently. All these leakages lead domestic income to decrease after the tariff is raised. Each dollar worth of the price wedge in the specific sectors leads to a drop of GDP by 66 cents. Raising an import barrier is clearly self-defeating. Such policies would also be particularly harmful to the fragile economic recovery by hampering the flow of commodities and resources to uses where they can earn the highest return.

Export restrictions at least achieve one objective: they reduce own exports. But they also reduce partner countries' exports who suffer from increased prices of imported raw materials. Importers will also have to substitute towards alternative, and more costly, sources of supply, leading to an overall loss in GDP that is more than proportional to the value of the export price wedge. The income effects on the country implementing the export restriction are mixed. Diversion of raw material supplies to domestic industries can sometimes have positive employment and income effects, but overall the effects are small. Available evidence suggests that in many cases export restrictions are not the most efficient or effective in achieving the stated objectives of income growth or environmental protection (OECD (2009).

Trade restricting policies, whether on imports or on exports, are thus found to be particularly inefficient and lead to welfare losses in the economy taking the measure and in partner economies. To assist the economy in its recovery from the crisis, OECD countries have not resorted to the large-scale use of trade restricting border measures and have concentrated on domestic stimuli. The next subsection investigates the impacts of those measures that have an indirect impact on trade.

Behind-the border measures

Behind-the border measures taken in response to the crisis can be classified into those aiming at the supply side and those aiming at the demand side of the economy. Within those two broad classes, one can further distinguish sector-specific policies from economy-wide measures (see Table 2).

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[8] The price wedge created by the tariff multiplied by the volume of trade.

Table 2: schematic setup of behind-the-border simulation experiments

	Supply-side	Demand side
Sector-specific	Subsidies or tax reductions for production factors labour and capital	Consumer subsidies or tax reductions
Economy-wide	[Financial system rescue, not modelled]	Government expenditures Generic consumer tax reductions

A total of 14 simulation experiments has been executed, where in each case the model is run five times: once for a co-ordinated scenario and four times for unilateral policy changes. The specification of the different scenarios is explained in detail in Box 1.

Box 1. Simulation Experiments

On the demand side, the following policy changes are simulated:

Demand 1	Increase government expenditures
Demand 2	Increase government expenditures, unemployment closure
Demand 3	Generic consumption tax reduction
Demand 4	Generic consumption tax reduction, unemployment closure
Demand 5	Generic consumption tax reduction consumption subsidy, increased marginal savings ratio
Demand 6	Domestic only consumption tax reduction
Demand 7	Consumer tax reduction on motor vehicles

And on the supply side, the following measures are simulated:

Supply 1	Factor subsidy for motor vehicles only, labour, standard closure
Supply 2	Factor subsidy for motor vehicles only, labour, unemployment closure
Supply 3	Factor subsidy for motor vehicles only, capital, standard closure
Supply 4	Factor subsidy for motor vehicles only, capital, unemployment closure
Supply 5	Factor subsidy for motor vehicles only, capital, unemployment closure, short run
Supply 6	Factor subsidy for motor vehicles only, labour and capital, standard closure
Supply 7	Factor subsidy for motor vehicles only, labour and capital, unemployment closure, short run

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A summary of the simulation results is presented in Table 2 and Table 3, using the multiplier effect as an indicator. As before, results are decomposed into own effects and partner effects.

On average across all simulations, one dollar worth of stimulus increases the volume of a country's own GDP by 0.64 dollars on average and world trade could increase by 0.08 dollars, but the effects on the real GDP of other economies are mixed. But the sign of these effects is not consistent, as the 95 per cent confidence intervals around the mean values indicate. This highlights that broad generalizations about the policy packages are not possible, and a closer look at the design characteristics of policy measures is important. A further rough decomposition into demand-side measures and supply side measures in Table 2 yields some more insights. Demand-side measures that target only domestic products, such as a tax reduction for domestically produced goods, would lower the average effectiveness of the measures, relative to the same policies implemented in a generic fashion, such as a general reduction in consumption taxes

irrespective of the origin of the product. The sign of the effects is still not completely certain, except for one important indicator: world trade volume would be negatively affected by a demand side measure that targeted domestic products only.

Broad generalisations across policy measures and across countries are clearly difficult and may be misleading. Table 3 provides some more detail on the relationships between design characteristics of measures and their average effectiveness, aggregated over countries, regions and commodities, but still there are wide variations. It can be observed that under the assumption of unemployment a given policy simulation has bigger and more positive effects than under a situation of full labour employment. Even though the representation of the labour market is very stylized in these simulations, this finding indicates that the assessment of policy options depends on whether some productions factors are underemployed or whether the economy operates at full utilization rates. Subsequent sections explore in more detail the mechanisms behind the average outcomes reported in Table 2 and Table 3.

Table 2. Summary multiplier effects of policies

Change relative to value of stimulus:	Mean effect	95% confidence interval	
		min	max
All measures			
Own real GDP	0.64	-0.14	4.83
Partner real GDP	-0.21	-0.90	0.06
World trade volume	0.08	-0.64	1.55
Demand-side measures, generic			
Own real GDP	0.51	-0.08	3.85
Partner real GDP	-0.06	-0.57	0.06
World trade volume	0.07	-0.15	0.87
Demand-side measures, targeting domestic only			
Own real GDP	0.00	-0.03	0.02
Partner real GDP	-0.02	-0.04	0.00
World trade volume	-0.15	-0.31	-0.04
Supply-side measures			
Own real GDP	0.84	-0.14	4.83
Partner real GDP	-0.35	-0.90	-0.01
World trade volume	0.12	-0.64	1.55

Table 3. Average multiplier effects by policy measure

Experiment	demand	supply	domestic only	sector specific	labour	capital	unemployment	other	GDP Volume		TRADE Volume of exports	
	2	3	4	5	6	7	8	9	own	world	own	World
Demand 1	x								-0.05	-0.05	-0.16	-0.09
Demand 2	x						x		0.05	0.01	-0.16	-0.08
Demand 3	x								0.01	0.01	-0.04	0.01
Demand 4	x						x		3.01	2.74	0.01	0.49
Demand 5	x			x					0.04	0.05	0.30	0.36
Demand 6	x		x						0.01	0.00	-0.25	-0.19
Demand 7	x							x	0.00	0.02	0.22	0.05
Supply 1		x		x	x				0.08	0.04	0.21	0.20
Supply 2		x		x		x			0.16	0.03	-0.70	0.18
Supply 3		x		x		x	x		0.51	-0.19	-0.70	0.16
Supply 4		x		x	x		x		3.95	3.39	0.32	0.87
Supply 5		x		x		x	x	x	0.44	-0.04	-0.76	0.17
Supply 6		x		x	x	x			0.11	0.05	-0.04	0.20
Supply 7		x		x	x	x	x	x	1.76	1.31	-0.35	0.46

Note: indicators are for WORLD totals. Trade indicators are calculated from qxwreg, GDP indicators from qgdp. The multiplier is calculated as the ratio of the change in the indicator variable to the money value of the policy shock.

International transmission mechanisms: demand side stimulus

The size and sign of the effects of stimulus measures are difficult to determine across the broad range of policy scenarios, and will obviously also depend on the characteristics of the country implementing the measure. Elements such as the size in the world economy, the openness to imports and the composition of imports, and the weight of exports in GDP will all play a role.

Two main channels play a role in transmitting a demand-side stimulus from one country to other countries. The first channel operates through trade. A domestic measure that stimulates consumption regardless of the origin of the goods will also tend to raise import demand. This leads to higher exports from partner countries, which will then tend to see an expansion of those industries that specialize in the goods that are now in higher demand in the country implementing the measure. At the same time, the demand stimulus tends to have an upward effect on prices of production factors in the country implementing the measure. This translates into higher export prices and loss of competitiveness in that country through an appreciation of the real exchange rate. Demand-side measure therefore tend to have a certain 'anti-own export bias', but

they can raise exports of other countries. How this increased export demand translates into higher GDP depends crucially on the specialization patterns in those countries.

The second channel operates through demand for investment and the allocation of global savings across countries. The country implementing the measure will typically see increased returns to capital as a consequence of the stimulus. This attracts capital from abroad, and lowers investments in countries that do not engage in the stimulus.

Movements of relative prices, rates of return and allocations of investment funds should be assessed against the no-policy baseline. Without stimulus packages, rates of return would have fallen more sharply, and the stimulus measures tend to at least dampen that downward movement. Hence, against the no-policy baseline, the effect is a rise in rates of return. When looking empirically at rates of return they might still fall short of their pre-crisis levels, but that is not the benchmark aginst which the model results should be compared.

Those mechanisms are illustrated in Table 4, which decomposes the per cent changes of the components of real GDP following a demand-side stimulus in a situation of unemployment. In this case a lowering of consumption taxes is simulated, equal to one per cent of base GDP in all cases (Demand 4). The top panel reports the results if only the EU25 implements the policy, the middle panel shows the results if the US unilaterally implements the policy and the bottom panel shows the results if all four big countries implement the same measure simultaneously.

The EU25 stimulus would raise domestic consumption by 2 per cent, and it would raise imports by 0.77 per cent. Investments would increase by 0.58 per cent, following the rise in expected rates of return to capital. The net effect on real GDP would be a 2.14 per cent increase, or an income multiplier greater than two. In contrast, other countries would experience a drop in their GDP despite an increase in exports to serve the EU25 import demand. The main channel at play is reduced investments in countries that do not see increasing rates of return to capital.

When the US implements the policy all those effects are also present and the 'anti-own exports' effect of demand side policies is more clearly visible. For the EU25 the positive effect on own exports is partly a result of intra-EU trade which is included in the figures. Investments in the USA are simulated to increase by 0.92 percent, drawing away investment resources from other countries. The rise in consumption and investments in the USA would further widen the global imbalance of savings and investments.

A country acting unilaterally will see marked changes in the composition of final demand. If all four countries, EU25, USA, Japan and China, simultaneously implement the demand stimulus, all of them would see a rise in returns and investments. However, as other countries are not implementing a stimulus policy they are faced with reduced domestic investments, which are only partly offset by higher exports so that on balance they register a negative effect on their real GDP.

Table 4. Decomposition of per cent changes of real GDP with demand stimulus

	Consumption	Investment	Exports	Imports	GDP
Only EU25 lowers consumption tax					
EU25	2.02	0.58	0.32	-0.77	2.14
USA	-0.18	-0.20	0.12	0.09	-0.16
Japan	-0.11	-0.30	0.09	0.07	-0.09
China	-0.03	-0.18	0.02	0.02	-0.04
Rest developed	0.00	-0.17	0.05	0.01	0.00
India	-0.04	-0.16	0.01	0.05	-0.01
Sub-Saharan Africa	0.00	-0.21	0.00	0.05	-0.01
Rest of World	0.05	-0.15	0.04	0.01	0.01
World	0.57	0.04	0.65	-0.20	0.61
Only USA lowers consumption tax					
EU25	-0.19	-0.33	0.22	0.12	-0.18
USA	3.70	0.92	-0.11	-0.64	3.86
Japan	-0.16	-0.43	0.13	0.10	-0.13
China	-0.03	-0.26	0.03	0.01	-0.04
Rest developed	0.03	-0.23	0.09	-0.05	0.01
India	-0.06	-0.23	0.01	0.08	-0.01
Sub-Saharan Africa	-0.06	-0.32	0.00	0.12	-0.02
Rest of World	0.06	-0.24	0.06	0.02	-0.01
World	0.99	0.04	0.43	-0.13	1.03
EU25, USA, JAPAN and China lower consumption tax					
EU25	1.71	0.06	0.66	-0.58	1.87
USA	3.36	0.55	0.10	-0.47	3.55
Japan	2.98	0.91	-0.05	-0.47	3.29
China	1.68	0.00	0.16	-0.60	2.34
Rest developed	0.03	-0.56	0.18	-0.01	0.00
India	-0.13	-0.53	0.02	0.19	-0.03
Sub-Saharan Africa	-0.08	-0.71	0.01	0.21	-0.05
Rest of World	0.14	-0.53	0.14	0.04	-0.01
World	1.92	0.14	1.23	-0.38	2.06

Note: experiment is Demand 4 (unemployment closure); The size of the shock amounts to 1 percent of base GDP; trade results for intra-regional trade in case of regional aggregates. The tables decomposes the percent change of the accounting identity GDP = C + I + E-M. A negative sign in front of the percent change of imports means that imports are growing; a positive sign means that imports are shrinking.

The simulated generic consumption stimulus lowers consumption taxes on all products, regardless of their country of origin. A variation on that policy is a reduction of consumption taxes only for products of domestic origin. Through lowering the relative price of domestic products, such a policy creates an expenditure bias towards domestically produced goods. Consequently, the impact on world trade is lower compared with a generic tax reduction, and the impact on world GDP is muted (see Table 5). The reduction of taxes only on domestic goods also stimulates the domestic and the world economy, but it is clearly a less preferable alternative. For the same size of policy package (one per cent of GDP) the generic tax reduction is more effective.

Table 5. Comparison of generic demand stimulus with 'domestic only' stimulus

	Generic	Domestic only	Generic	Domestic only
	Per cent change world imports		Per cent change world GDP	
Only EU25 lowers consumption tax	0.20	0.11	0.61	0.51
Only USA lowers consumption tax	0.13	0.10	1.03	0.99
EU25, USA, JAPAN and China lower consumption tax	0.38	0.25	2.06	1.91

Note: experiments are Demand 4 and Demand 6 (unemployment closure); the policy shock amounts to 1 per cent of GDP in all cases; trade results for intra-regional trade for regional aggregates.

Further simulation results show that demand-side measures that are sector-specific can lead to economy-wide efficiency losses. The better option is a demand-side stimulus that allows consumers to decide themselves where to spend transfers generated by the policy. While a sector-specific demand stimulus can generate a boost in output in that sector, it generates by design also an expenditure bias towards that particular industry, hence potentially leading to slowdown in other sectors of the economy. At the same time, imports of goods into the stimulated sector can act as a transmission channel to foreign producers, both in final goods and in intermediate inputs.

An expansion of government expenditure can lead to a drop in GDP volume (but an increase in GDP value), and it leads to negative effects on own exports. This result is mainly due to the current pattern of government expenditures. Current government expenditures are mainly on non-tradeables, especially public services. Stimulating the non-tradeable portion of the economy draws resources into it and increases price levels (GDP value goes up), but hampers the export sectors who see their products become less competitive. This is a variant of the Dutch disease effect. However, increased public investments in public goods such as infrastructure and R&D may have positive productivity effects in the longer run, which the current analysis is unable to quantify.

Supply-side measures

All simulated supply-side measures register unambiguously negative effects on partner countries' GDP, and most simulated supply side-measures record a negative multiplier on own exports. This is explained by the sector-specific nature of those measures: if one sector is singled out for the stimulus, resources are drawn from other activities into that sector. While this particular sector may well see its exports rise as a result of the subsidy, other sectors witness a decline which comes from an appreciation of the real exchange rate. Drawing resources into the target sector tends to bid up factor prices in the economy, which makes the country's exports more expensive relative to other countries. Obviously, the strength of this effect depends on the utilization rate of production factors in the base situation. If there are un(der-) employed resources, the rise in factor prices, and hence the real exchange rate appreciation, would be more muted.

Partner countries' GDP tends to be negatively affected by unilateral supply-side measures. Contrary to demand-side measures, the international spillover effects through trade and investment are predominantly negative. Supply-side measures boost output in one country and drive other suppliers from the market through a reduction of production costs in the country implementing the measure. Here lies also a danger of engaging in a mutual subsidy spiral that in the end serves mainly the factor owners in the sector being subsidized, but is wasteful from an economy-wide perspective.

The inefficiency of sectoral supply-side measures is illustrated in Figure 1, which reports the change in the share of motor vehicles in industrial real value added (total value added minus agriculture and food processing; oil and gas; natural resources; and services) for the case of a factor subsidy to motor vehicles only. The factor subsidy, in fact a reduction of factor taxes, is afforded to both labour and capital, while there is unemployment of labour.

When all four countries, EU-25, USA, Japan and China, simultaneously engage in such a policy, the share of motor vehicles in industrial value-added increases. This increase may not seem big: in Japan, for example, the share goes up from 10.8 percent to 11.1 percent, but in this change substantial absolute amounts of money are involved. In real terms, factor owners in the motor-vehicle industry would see their income increased by about 1 per cent in the EU25 and in the USA, by 2.8 per cent in Japan and by 0.5 per cent in China. This type of policy creates rents in one particular sector that makes it more difficult to reverse the policy once the economy has resumed growth. In addition, the transfer efficiency of this sectoral policy is low. Although real GDP is found to increase in those regions implementing the policy, the multiplier (change in GDP per global dollar of sectoral tax reduction) is as low as 0.021 for China, 0.13 for Japan and 0.5 for the EU25 and the USA. The higher value for the EU25 and the USA is related to the relatively larger employment effects, both direct and indirect, that give the motor-vehicle industry in those two countries a particularly large weight in the economy.

Simulations show particularly negative effects if the subsidy (or tax reduction) is afforded only to capital. If the price of capital is lowered relative to that of labour, a substitution towards more capital use occurs, and this can be detrimental to employment. With labour unemployment, reducing the tax burden on wages generates more positive effects on GDP and employment. The multiplier on a country's own GDP (both value and volume) is found to be exceptionally high in that case: lowering labour costs, while keeping real wage rates for workers constant, leads to an expansion of output and to additional employment that generates additional income for households which subsequently trickles second-round income effects.

Figure 1. Change of Motor Vehicles share in value added with sectoral supply stimulus for motor vehicles.
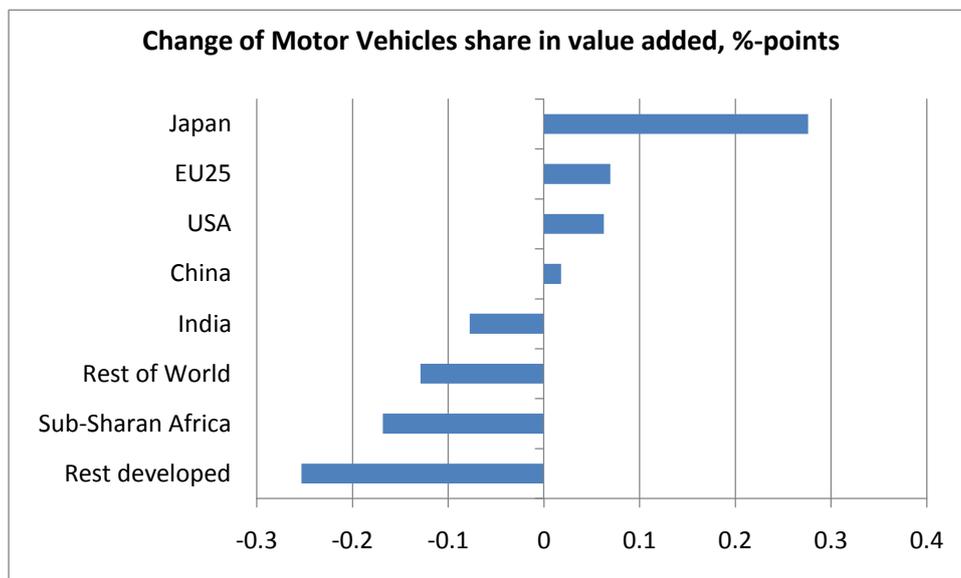
Note: The experiment is SUP7, factor-tax reduction on labour and capital; labour unemployment

Statistical decomposition of simulation results

The 14 sets of simulations, and within each set four unilateral policy moves plus one coordinated results, yield a rich set of results that turns out to somewhat unwieldy. The policy experiments display much variation in design and as a result the outcomes are hard to synthesize. In order to guide policy assessment the policy effectiveness indicators can be further decomposed using regression analysis in order to relate the design characteristic of the policy to its effectiveness as defined by the multiplier. The regressions reported in table 6are performed over the set of simulation results on unilateral policy moves, yielding 56 observations. As can be seen, only a few of the estimated coefficients are highly statistically significant, and hence the estimates need to be carefully interpreted. Nonetheless, the table could be used as a guide.

Table 6: Policy design characteristics and policy effectiveness

Explanatory variables:	Own real GDP		Partner real GDP		World real GDP		Own export volume		Partner export volume		World trade volume	
	Dependent variables — per dollar of policy stimulus impact on change in:											
Demand or supply measure (1/0)	0.787	*	0.247	***	1.034	***	0.747	***	-0.463	***	0.285	**
Domestic only (1/0)	0.018		-0.073		-0.055		-0.242		0.095		-0.147	
Sector specific measure (1/0)	0.036		-0.06		-0.023		0.032		0.096		0.129	
Labour or capital subsidy (1/0)	1.259	***	0.144	***	1.403	***	0.857	***	-0.54	***	0.317	***
Unemployment (1/0)	1.557	***	-0.326	***	1.231	***	-0.056		0.227	***	0.171	***
EU15 (1/0)	0.332		0.045		0.377		0.35	***	0.188	***	0.538	***
USA (1/0)	0.535	**	-0.044		0.491	**	0.072		0.079		0.152	*
Japan (1/0)	0.158		0.032		0.19		0.044		0.126	*	0.17	**
Constant	-1.06	**	-0.199	***	-1.259	***	-0.882	***	0.376	***	-0.507	***
Number of observations	56		56		56		56		56		56	
R^2	0.51		0.784		0.463		0.556		0.618		0.436	
F-statistic	6.109		21.327		5.059		7.343		9.485		4.535	
legend: * p<0.2; ** p<0.2; *** p<0.1												

For example, suppose the EU25 were to spend unilaterally 1 euro (or dollar) on a stimulus package. The economy is characterized by unemployment on the labour market. This 1 euro would translate into 1.6 (=-1.06 + 0.332+1.557+0.787) euro worth of own real GDP if spent on a generic demand-side measure, such as lowering consumption taxes. But it would translate to only 0.87 euro (=-1.06 + 0.332+1.557+ 0x1.259+0.036) real GDP if spent on reducing capital cost in one sector. Similarly, the effects on partner GDP and on trade volumes can be traced out, bearing in mind the limited statistical significance of the estimated coefficients.

The incentives to co-ordinate

The results show significant spillover effects from unilateral policies, which provide a strong rationale for multilateral co-ordination of policies – both in their design and in developing exit strategies To investigate the incentives to coordinate, Table 7 shows a pay-off matrix where the average multipliers on own national income and the national income of other economies that potentially participate in co-ordination (EU25, USA, Japan and China) are given. The simulation experiment singled out is a generic consumption tax reduction in a situation of unemployment.

If no country engages in any policy, the effects are zero for everyone. If one country implements the policy, but others do not, the own pay-off is 3.03 (= additional national income per dollar of consumption-tax reduction), but the pay-off for the other economies is a negative -0.33. If all countries implement the policy, each will receive a pay-off of 2.71. Given this incentive structure, all countries will find it optimal to implement the policy. Regardless the actions of others, the pay-off for the own economy is always greater if the policy is implemented compared with not implementing the policy. Likewise, other participating economies always receive a greater pay-off from implementing than not implementing the policy. Hence, the Nash equilibrium of that game (implement, implement).

Table 7. A coordination equilibrium for a demand-stimulus policy under unemployment

		other participating economies			
		No policy		Implement policy	
own economy	No policy	0.00	0.00	-0.33	3.03
	Implement policy	3.03	-0.33	2.71	2.71

Note: experiment implements a generic consumption-tax reduction under conditions of unemployment; numbers are average effects (multipliers) of the equivalent variation (EV) in response to a policy shock; the first number in each cell gives pay-off for the row player; the second number gives the pay-off of column player.

It thus appears that multilateral coordination amongst the big economies is a natural outcome. However, there are negative spillovers on those economies not participating in the stimulus packages. With massive fiscal stimulus packages the centre of gravity of the world economy can shift, and especially low-income economies may find themselves disadvantaged by their inability to implement such domestic policy packages. They might be tempted to assist their domestic industries by border measures. Table 7 shows the pay-off structure of such a game between the co-ordinating economies and 'retaliating economies'. The co-ordinating economies are simulated to engage in the demand stimulus policy with full employment, whereas Table 7 assumed unemployment. The retaliating economies are all the other regions in the model, and they are simulated to implement a 5 per cent increase in all border tariffs.

Table 8 illustrates a number of important points. First, if tariffs are raised it affects negatively national income of all countries, including the country raising the tariffs. This is a well-known welfare effect of border measures and arises mainly from efficiency losses in the wake of raising barriers against competitive foreign suppliers. Second, and contrary to the co-ordination game on stimulus packages, if all countries implemented their respective policies the overall pay-off for the world would be negative. In fact, raising tariffs if other countries implement fiscal stimulus packages increases the damage to the tariff-raising country, because it closes itself against cheaper imports. This may benefit some domestic producers but others who depend on imports of intermediate goods as well as consumers are negatively affected.

What can be the outcome of this game? Co-ordinating economies find it always better to implement their fiscal stimulus policies than not implementing. If they implement, and no tariff retaliation occurs, they receive a pay-off of 0.02 dollar per dollar of stimulus. If retaliation occurs, their pay-off is turned into a negative -0.02 dollar, but this is still better than doing nothing, since they would lose - 0.03 dollar per dollar of tariff revenue earned in retaliating economies. However, retaliating economies are better off from refraining from raising tariffs. They would still lose -0.02 dollar per dollar of fiscal stimulus, but this is clearly better than losing -0.06 dollar. The Nash equilibrium of that game would thus be for coordinating economies to implement the policy and for the other economies not to retaliate.

Table 8. Retaliation with border measures does not pay off

		Other economies			
		No policy		Raise tariffs	
coordinating economies	No policy	0.00	0.00	-0.03	-0.04
	Implement fiscal stimulus	0.02	-0.02	-0.02	-0.06

Note: experiment implements a generic consumption tax reduction, standard closure for 'co-ordinating economies' and a five percent tariff raise on all commodities in 'other economies'; Numbers are average effects (multipliers) of the equivalent variation (EV) in response to policy shock; the first number in each cell gives pay-off for row player, the second number gives pay-off of column player.

5. Conclusions: Towards a roadmap for policy design

The stylized simulations of policy measures yield insights into their wider economic effects, and they can alert policy makers to unintended side-effects that only become apparent when taking an economy-wide and international viewpoint. Specific implementation details play a great role, but those are impossible to incorporate into a simulation analysis as pursued here.

The analysis highlights the need to properly target policy measures. If the problem is a shortfall in demand, as is the case in the current economic crisis, demand-side measures are more appropriate than supply side measures. Demand side measures tend to work better, both on the own economy and partners. The one supply-side policy that is an exception is a labour market policy. Amongst the supply-side policies, the best option is to lower the tax burden on labour. If the problem is unemployment, the appropriately targeted response is a labour market policy, not a subsidy to capital.

The specific design characteristics of demand-side measures determine their effectiveness in terms of their impact on GDP and on trade. Even if they are not by design discriminatory, indirect effects through trade and investment can limit their efficiency – both on the domestic economy and globally. The analysis finds that policies that bias demand towards specific sectors, and those that are biased towards domestic products, are inferior to those that are more generic in design.

Demand-side measures that are sector specific tend to bring economy-wide efficiency losses. While a sector-specific demand stimulus can generate a boost in output in that sector, they generate by design also an expenditure bias towards that particular industry, hence potentially leading to a slowdown in other sectors of the economy. The better option is a demand-side stimulus that allows consumers to decide for themselves where to spend transfers generated by the policy.

Governments engaging in massive public investment projects should be aware of potential adverse effects. If the expansion of government expenditures occurs in non-tradeables (or less traded goods and services), such as services, the boost in those sectors attracts resources from parts of the economy, which bids up factor prices and makes tradeable sectors less internationally competitive. This in turn may be detrimental to real GDP. If public investments are coupled to "buy domestic" provisions, their efficiency is very much

lowered. An increase in the volume of government expenditures should be carefully targeted at investments that generate future productivity gains.

Shifting government demand towards private demand will be a challenge when exiting from public expenditure policies.

Sectorally specific supply-side measures are found to yield overwhelmingly negative spillovers on partner countries, through lowering production costs in one country relative to the world market. This can lead to a wasteful mutual subsidy spiral. They also bear negative effects on the own economy, through maintaining or creating inefficiencies.

Sectorally specific supply-side measures create rents in the sector being stimulated that tend to become incorporated into the value of fixed assets which makes it more difficult to reverse the policy once the economy has resumed growth. In addition they are not very transfer efficient.

Non-participating countries, especially low-income economies may find themselves disadvantaged by their inability to implement policy packages that support their domestic industries. They might be tempted to assist their domestic industries by border measures. However, raising tariffs if other countries implement fiscal stimulus packages increases the damage to the tariff-raising country, because it closes itself against imports that become cheaper in the wake of fiscal stimuli implemented elsewhere. This may benefit some domestic producers but others who depend on imports of intermediate goods and consumers are negatively affected. As a result, there is an economic incentive not to raise tariff as retaliatory measure.

Border measures, both on the import side and on exports are found to have the largest negative effects of all measures considered. They score negatively on the economy-wide income effects in the country implementing such measures as well as on the income of partner countries. Implementing import protection also harms a country's own exports, and hence throws further sand into the machinery of economic recovery. Export restrictions on raw materials raise world prices of those products and they force foreign processing industries to search for alternative suppliers in the short- to medium term. Effects on the domestic economy are mixed.

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