

Online Annex 1.1. Global Spillovers from the Fiscal Packages in the European Union, and the United States

This annex provides further details on the expected impact on the global economy of a few large fiscal packages announced, going through either legislative discussion or the initial phases of implementation in advanced economies since the time of the publication of the April 2021 Fiscal Monitor.¹ The focus is on United States' American Jobs Plan (AJP), the American Families Plan (AFP) and the EU's Next Generation European Union (NGEU). The analysis is based on publicly announced plans and do not necessarily reflect the measures ultimately approved or implemented.

The results from the model-based analysis are derived using the IMF's G20MOD, a semi structural model, part of the IMF's Flexible System of Global Models (FSGM). It allows to simultaneously analyze a larger number of countries than structural open economy DSGE models.² It has an individual block for each G20 country and four other blocks that complete the rest of the world. Being a semi-structural model implies that some key elements (private consumption and investment) are built on households and firms optimal choices while others, such as trade, labor supply and inflation have reduced-form representations, designed to incorporate empirical information in the determination of variables dynamic behavior. This combination of structural and empirical based components allows to introduce a higher degree of heterogeneity into the behavior of individual countries in comparison to what is feasible with calibrated DSGE models (for more on the model see Andrieu and others 2015).³

A. The Packages

In most AEs fiscal policy is now shifting toward the goal of “building back better”. The exact features of this policy shift vary across countries' specific circumstances.

The Next Generation EU (NGEU): The approval of the new EU's long-term budget and of the NGEU plans mark the largest stimulus package ever financed in Europe (estimated at about 6.2 percent of 2021 GDP of the EU). The NGEU, will provide resources in the form of grants and loans for research and innovation, public investment, climate and digital transitions, and health crisis preparedness.⁴ The program's financing facility, the *Recovery and Resilience Facility* (RRF), has been designed to provide a larger support to those countries counting with smaller fiscal space.

The repayment of the borrowing is expected to take place through new EU revenues--a recycled plastic packaging waste tax, a carbon border adjustment tax, a digital levy, an emissions trading scheme, or a financial transactions tax--or by additional country contributions.

¹ This is not an exhaustive analysis as national budgets of various numerous advanced economies are expected to provide additional fiscal support by the Fall.

² Structural DSGE models are rigorously derived from households' and firms' optimization problems. The technical complexities associated with such derivation impose severe limitations in the number of countries that can be simulated simultaneously. For example, the IMF's Global Economic Model (GEM) and the Global Integrated Monetary and Fiscal Model (GIMF) have a practical constraint of six for the maximum number of countries that can be included in their simulations.

³ The simulation results assume inflation targeting, one and two year monetary accommodation in the USA and EU respectively (central banks react to inflationary pressures with only small delay) and automatic stabilizers operating (unemployment insurance and similar programs react to cyclical movements in output).

⁴ For the less unequal economies in Europe, digitalization might present smaller trade-offs between efficiency and equality than in other parts of the world. For example, a recent IMF study⁴⁰⁷ for Czech Republic (an European country with one of the lowest levels inequality, e.g., Gini in 2019 was 24) found that digitalization and technical modernization could have a positive impact on productivity with relatively small undesirable effects in income inequality.

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The American Families Plan and the American Jobs Plan:⁵ The goal of these packages is to increase investment in infrastructure, incentivize human capital accumulation, improve productivity and, in addition, provide a structural upgrade of social safety nets to tackle deep-rooted inequalities.⁶ The average yearly size of the measures over the next 10 years of the American Families Plan (AFP) and the American Jobs Plan (AJP) are estimated at 0.8 percent of GDP and 0.9 percent of GDP respectively. These plans are expected to be partially financed through revenue measures aimed to increase corporate income, personal income, and capital income tax revenues and to close tax loopholes.

For each of the two origin regions (EU and USA), the plans are expected to increase GDP, consumption, investment, employment, and international trade. The total effect of the packages will increase the combined GDP of the two regions by US\$ 4 trillion by 2026 (domestic effects and spillovers across the 2 regions). For the EU private investment is expected to increase proportionally more than consumption, reflecting the focus of the package on expanding the productive capacity of the economy. In the USA, which package also includes a large investment component, private consumption will receive a stronger push, reflecting the effect of redistributive policies on the overall aggregate demand. Related to the external sector, for both the EU and United States imports are expected to increase more than exports, explaining to a large degree the effect that plans will have in the rest of the world via trade links. Commonly the expected effect on the external sector of fiscal stimulus is more muted than in the domestic economy; however, for the case of these packages the robust external response is explained by the larger government import propensities associated with public investment, compared to those propensities seen for targeted and general transfers.

B. International Spillovers

These fiscal packages could have substantial effect on the global economy. The source of the spillovers will be their impact on international trade (higher global exports and imports) and international prices (higher price levels for all goods, especially for commodities, and higher interest rates). From the US\$4.6 trillion in real terms that these packages are expected to add to global GDP by 2026, spillovers would be 16.2 percent of the total, approximately 0.6 percent of 2021 global GDP, with a large share reflecting the effects of the expansion of the U.S economy. Countries with stronger commercial ties to the EU and USA will experience larger positive benefits, those with weaker links will be subject to spillovers mainly through the impact of higher international prices in their economies (see Figure 1.5 in the main text for the effect of the package on international prices). In the same way, those countries with large financing needs and smaller fiscal space might feel increased pressure due to the possibility of observing higher interest rates. Figure 1.1.1 illustrates the expected cumulative impact of the fiscal stimulus in the origin countries on other countries.

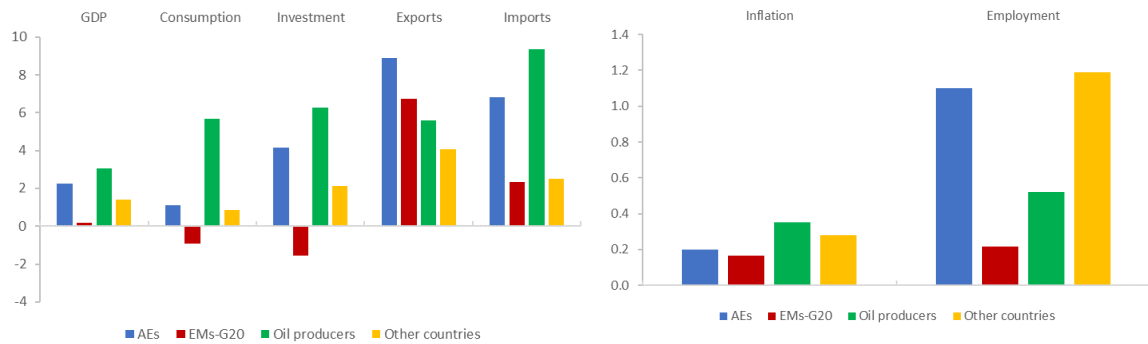
The positive spillovers of the joint fiscal impulse on consumption and investment are expected to be stronger for advanced economies and oil producers, for example, among advanced economies the cumulative impact on Canada and United Kingdom real GDP is expected to be around 5.2 percent and 1.8 percent respectively. Among oil producers Saudi Arabia real GDP is expected to be higher by 5.8

⁵ On August 10, the US Senate passed a bipartisan infrastructure bill that includes about \$550 billion in new spending. The bill is under discussion in the US House of Representatives and a final vote on the package by September 27 has been agreed upon. The administration has indicated it remains committed to the remaining components of the Jobs and Families Plans that were not incorporated into the bipartisan proposal.

⁶ The AJP includes investments in transportation infrastructure (fixing and rebuilding highways, bridges, airports, ports, and transit systems) and other infrastructure (clean drinking water, renew electric grid, high-speed broadband, upgrade of schools and federal buildings) and investment in work force development (training programs, improved benefit and labor protection rule systems). The AFP includes several initiatives that are expected to benefit mostly low income families, among others: i. Extension of years of public education to include two years of universal preschool and two years of post-secondary education; ii.) subsidies to cover medical insurance premiums; iii.) nutrition support; iv) increased direct transfers to families with children; v.) tax credit favoring low-income workers; vi) it will create a family paid leave program (for a more detailed description of the AFP see annex 1).

percent.⁷ Employment is expected to respond slightly more in other developing economies than in advanced economies.⁸ In particular, at a cumulative 1.2 percent on average, the increase in employment in other developing economies would be higher than the expected increase in employment in advanced economies like Australia (0.7 percent) or Korea (0.4 percent) and only slightly lower than the expected increase in United Kingdom (1.4 percent).⁹ Inflation is expected to rise for oil producers and developing economies, though for different reasons: for oil producers a higher inflation would be the result of demand pressures, while for other developing countries it would be the result of binding productive constraints. Emerging-G20 economies are expected to see their investment and consumption decrease despite exports being significantly larger, for instance, while consumption is expected to increase slightly in cumulative terms in Brazil (0.2 percent) it could fall in countries like Argentina (-0.6 percent), India (-0.9 percent) and Turkey (-1.4 percent). Interestingly, despite the contraction in consumption and investment, imports in those countries increase, mostly in response to the surge in exports, as exports in these economies have a large import content.

Online Annex Figure 1.1.1. Cumulative Spillovers of the Joint Fiscal Stimulus



Source: IMF staff calculations.

⁷ The larger effect on GDP for Saudi Arabia relative to other oil exporters is explained jointly by the country’s larger than average share of the global oil production and the larger than average share of the oil sector in the economy (45 percent of GDP).

⁸ Other countries group includes all EMs not in the G-20 as well as LIDCs.

⁹ The change of 0.7 in employment for Australia is on top of the changes that would result from the implantation of the JobKeeper wage subsidy program (equivalent to 4.5 percent of GDP) during twelve months through March 2021.

Online Annex 1.2. The Long-term Distributional Impact of the American Families Plan

The measures in the American Families Plan (AFP) could have significant long-term distributional and economic effects if they were made permanent. To assess the potential impact, we use a model to analyze the effects of the different measures. The analysis takes into account the demographic structure of the economy (family structure and level of educational attainment), the taxation structure (personal and capital income tax schedules as well as earned income tax and child tax credits), and the productive structure (disaggregating it in three sectors: low human capital content services, high human capital content services and tradable goods). An incomplete-markets, stochastic dynamic multi-sector, heterogeneous agent, general equilibrium model calibrated to the USA (see Lizarazo, Peralta-Alva and Puy, 2017, for details on the model) is used to simulate the policy changes and quantify their effects in the economy.

Policy changes. The analysis considers the following measures (based on public announcements):

Earned Income Tax Credit (EITC): The credit for single-person households will increase approximately by three from a current maximum of \$538 to \$1500. The coverage of the EITC will also increase. For example, the change will imply that a single-person household earning approx. US\$ 20,000 could see its effective tax rate decline by approx. 1 percent. The estimated cost per year of this program is about 0.05 percent of GDP.

Child Tax Credit (CTX): The child-tax credit will increase for those families earning less than \$150,000 (married) and \$112,500 (head of household), from \$2,000 per qualifying child to \$3,000 for children over six and \$3,600 for children under six. The cost of this policy change is estimated at 0.24 percent of GDP per year.

Tertiary Education: This measure would pay for two-years of free community college and support other postsecondary education for students from poorer families, at a yearly cost of around 0.1 percent of GDP.

Pre-K: The plan aims to provide access to high quality pre-school education. Empirical evidence suggest that the measure is likely to support an increase in labor participation by women, aiding to reduce the labor participation gender gap. The cost of this measure is expected to be 0.09 percent of GDP per year.

Affordable childcare options: The plan aims to provide high quality childcare options for families with children under 5 years-old, fully covering the costs for the poorest households and keeping childcare costs for other low and middle-income families below 7 percent of their income. The yearly cost is expected to be 0.1 percent of GDP.

Other transfers:

Health Insurance Premium Tax Credit: This program will provide a monthly \$50 subsidy for covering health insurance premiums. It is expected to increase health insurance coverage by 4 million people and to reduce its costs for another 9.5 million people, it is expected yearly cost is 0.09 percent of GDP.

Nutrition Support to low-income families: The initiative will allow families with children currently benefiting from free and reduced lunch during the school year to buy food during the summer. It also allows schools in high poverty areas to expand the eligibility criteria for free meals during the school year. The expected yearly cost of the program is 0.04 percent of GDP.

Paid Family Leave: Prior to the pandemic the United States was one of the few countries that didn't guarantee paid family leave. In addition to reduce the incidence of loss wages due to family illness, this

policy initiative will reduce the non-monetary costs of working outside the home potentially increasing labor participation.¹ The expected yearly cost of this program is 0.1 of GDP.

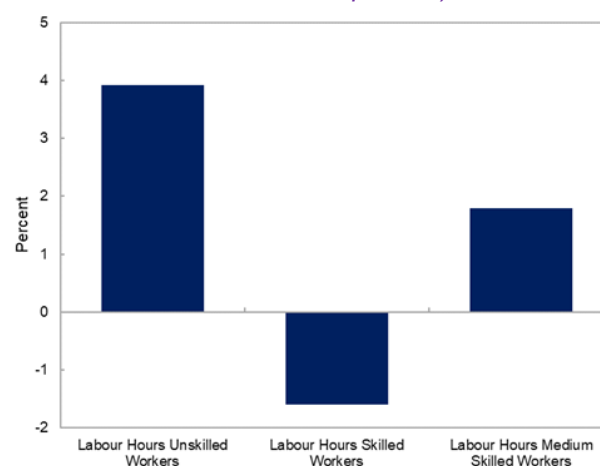
Tax changes: The plan will increase the top income tax rate from 37 percent to 39.6 percent restoring the top bracket to its form before the 2017 tax reform. The plan will also eliminate capital income tax breaks for individuals at the top of the income distribution ensuring that they pay the same tax rate in all their income independently of the source of such income (labor or financial investment).

Overall Impact of the Measures in the AFP. The effects of the policies in the AFP on the economy can be divided in to three different categories. First, the impact in *labor markets*, second the *macroeconomic* impact, and third, the *distributional* impact. This last impact depends directly on the fiscal policy progressivity (expenditure and taxation choices) and indirectly on the effects of the policies on labor markets and the macroeconomic aggregates.

Labor Markets. Figure 1.2.1 illustrates the impact on effective hours per worker by educational attainment (skill) level. Beyond improving labor productivity for those benefiting from them, the subsidies to tertiary education augment the size of the highly educated work force and reduce the size of the work force with low-education level. The share of the workers with mid-educational attainment level in the population remains unchanged.² Labor is not perfectly substitutable across human capital levels types and therefore wages depend on the relative abundance of workers with a particular set of skills. The larger share of the highly educated workers in the population will reduce their relative wages, compressing their wage premium and reducing the individual hours supplied by them to the market. Workers with low educational attainment levels on the other hand would enjoy higher relative wages and would be willing to supply more time to the labor market. In addition, the measures that promote labor force participation of caretakers (childcare, universal preschool, and paid family leave), by reducing the implicit costs of working outside home, increase workers supply of labor for those with low and mid educational attainment levels. It is important to note that programs promoting labor force participation can counteract the negative impact of unconditional transfers (e.g., CTX) in the incentives to work (see Guner and others 2020).

Macroeconomic Impact. The long-term macroeconomic impact of the plan on GDP is projected to be around 4.7 percent (Figure 1.2.2).³ The productive capacity of the economy would expand due to the investments in education (subsidies to tertiary education) and the impact of some of the measures in

Online Annex Figure 1.2.1. Effective Hours per Worker per Education Level
(Deviations from the baseline, percent).



Source: IMF Staff Calculations.

¹ Currently nearly one in four mothers have to return to their job only two weeks after giving birth and one in five workers close to retirement left the work force earlier to take care of an ill family member (see AFP fact sheet).

² The simulations assume that every year 2.5 million students benefit from those subsidies, half of those move from low to mid educational attainment level (from high school to having some college degree) and half move from mid-skilled to high-skilled (from some college degree to its completion facilitating the transition to a graduate degree). The cost for two years of community college is assumed to be \$10,000.

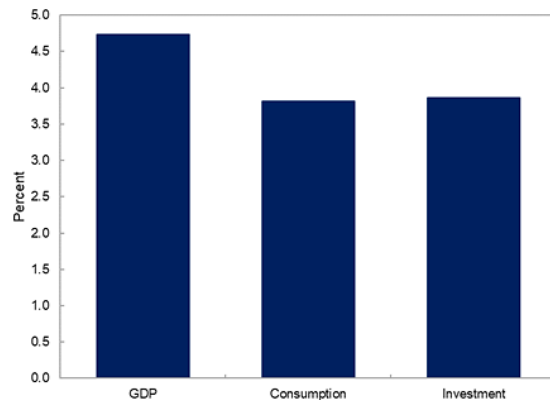
³ The magnitude of the impact in GDP estimated in here is larger than the actual projected impact in the IMF's World Economic Outlook projections as, for illustrative purposes, this analysis assumes that all measures taken in the AFP are permanent (instead of being in place for only 10 years), resulting in a permanent impact in both demand (consumption and investment) and supply (permanently higher levels of labor participation and human capital).

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labor participation (childcare, universal preschool, and family paid leave). Higher average labor participation and human capital levels provide important incentives for private investment, while government transfers allow private consumption to rise.⁴ The AFP will be financed through an increase in income and capital tax rates for those at the top of the distribution, and the higher tax rates would translate in lower savings to GDP ratio at any given rate of return, mitigating the expansionary impact of the plan in the level of GDP over the long term.

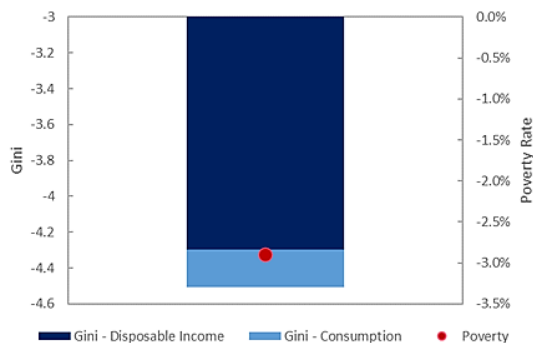
Distributional Impact. The distributional effect of the previous measures is projected to be significant. The headcount of people under the poverty rate is forecasted to fall by nearly 1/3, going from 10.5 percent to 7.6 percent. As minorities, young people, adults over 65, and single-female headed households are over-represented among those under the poverty line (bottom decile of the income distribution), the measures in the AFP would also help address inequalities of opportunities and poverty incidence along racial and gender lines, and could benefit future generations through their impact in child poverty reduction (for more on inequality of opportunities see Fiscal Monitor April 2021).^{5,6,7} Income inequality is also expected to decrease.

Online Annex Figure 1.2.2. Macro Variables
(Deviations from the baseline, percent)



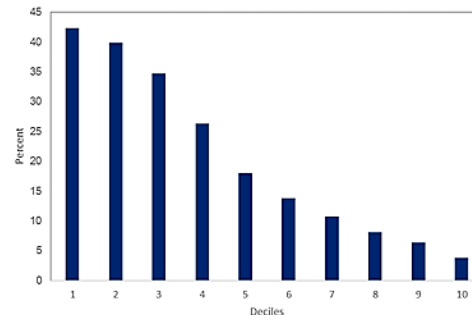
Source: IMF Staff Calculations.

Online Annex Figure 1.2.3. Poverty Rate and Gini Coefficients
(Deviations from baseline)



Source: IMF Staff calculations.

Online Annex Figure 1.2.4. Household's Consumption Level
(Deviations from the baseline)



⁴ This analysis ignores a continuous process of automation of the economy or a continued reduction in the relative price of capital goods, both of which could increase the productive capacity by more than the current forecasts.

⁵ Whereas Black and Hispanic households account for 14 and 13 percent of the total number of households, according to the Census data for 2019, those types of households represent a much larger proportion of the population in the bottom decile of the income distribution (26 and 16 percent).

⁶ Female-headed households correspond to 30 percent of the total number of households in the United States, but 58 percent of households on the bottom decile are female-headed (only 7 percent of the households in the top decile are female-headed).

⁷ Young adults (ages 15 to 24) and older adults (65 and older) are 7.4 and 2.3 times more likely to be in the bottom decile than to be in the top decile of the income distribution. Children are also more likely to be in the bottom decile than in the top decile of the distribution: the average number of children in the lowest decile (1.1) is 30 percent higher than the number in the top decile (0.86). Even further, low-income families are more likely to have a higher number of children than high-income families: 56 percent of households in the lowest income decile have two or more children versus 45 percent of households in the highest decile. Couples and families, with more than one earner are more prevalent in the top deciles of the distribution: the mean number of earners in the bottom decile of the distribution is 0.29 (reflecting the large incidence of lack of jobs in this segment) versus 2.1 earners in the top decile of the distribution.

The ratio of disposable income of the households in the top decile to those in the bottom decile is predicted to fall by 28 percent from 14.4 to 10.3. Another measure of inequality is the Gini coefficient. Disposable income Gini will fall by 4.3 points, and consumption Gini would fall by 4.5 points, though market income Gini will only fall by 2.0 points. Wealth income Gini will fall by 5.3 points.⁸ Figure 1.2.3

shows the long-term impact of the plan on poverty rates and the disposable income and consumption Gini. Figure 1.2.4 shows the resulting changes in household consumption across deciles: Household consumption of the bottom decile will increase 8 times as much as the consumption of the households in the top decile. Along educational levels, consumption for workers with low levels of education will increase (Figure 1.2.5). Whilst consumption for mid-skilled workers falls in average, the change masks some differentiations, as mid-skilled workers with lower income levels see their total consumption raise.

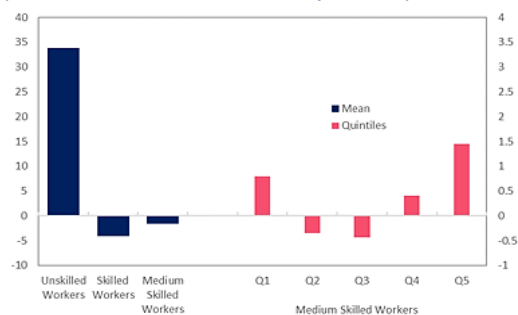
The distributional changes can be traced to: (1) the higher wages and longer working hours outside home for those with low and mid human capital levels resulting from the educational subsidies and policies promoting labor participation; (2) the large size of the transfers that are especially important for low-income families; (3) the higher progressivity of taxation achieved by reducing the differentiation in taxation for income coming from different sources (labor or capital).

The overall distributional impact of the measures in the AFP is foreseen to counteract to some degree recent trends on income polarization as the shares of disposable income of those in the middle of the distribution increase by more than those at the top of the distribution.

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Online Annex Figure 1.2.5. Consumption according to the Level Of Human Capital (Deviations from baseline, percent)



Source: IMF Staff simulations.

⁸ The Gini coefficient is a statistical measure of dispersion. It is used to measure the degree of similarity or the degree of inequality (dispersion) in incomes, consumption and wealth levels. Its values fall in a range between 0 and 1; a value of 0 is seen when there is perfect equality, a value of 1 is seen when there is very high inequality (for example only one person owns the totality of the wealth in the economy). In practice, according to the latest available data in the World Bank database, the Gini for the income distribution ranges between 25 for Czech Republic and Slovak Republic and 63 for South Africa.