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WORKING PAPER

# Financing the Transformation of Food Systems: A Flow of Funds Approach

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## FINANCING THE TRANSFORMATION OF FOOD SYSTEMS: A FLOW OF FUNDS APPROACH

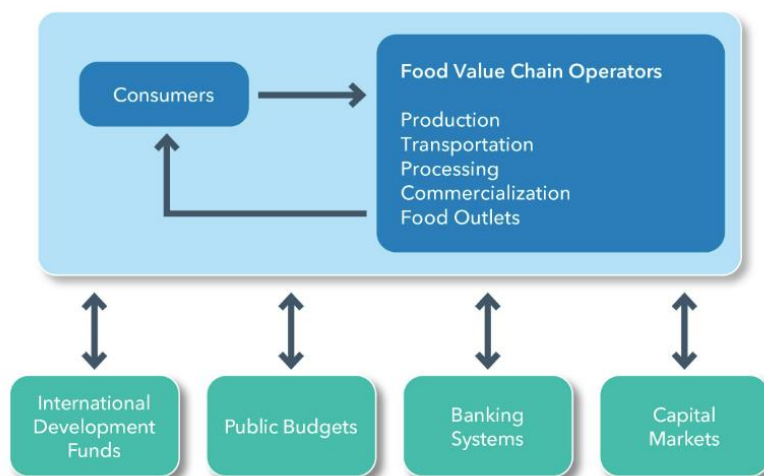
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### WHAT DO WE MEAN BY “FINANCING”?

In the debates about financing the transformation of food systems (or any other activity) many focus on international development funds (such as those of multilateral development banks, agricultural and environmental funds, and the like); some look at capital markets and different instruments and business models; others analyze loans from the banking system; and similar partial aspects of the full picture considered here as “financing.” Following Díaz-Bonilla et al. (2021) and Díaz-Bonilla (2021a) a broader notion of financing is used here considering the flow of funds related to food systems, roughly following a framework of social account matrices used to organize transactions in economic systems (Pyatt and Round, 1985).<sup>2</sup> This allows the consideration of different types of “budget constraints” or the accounting identities related to the double-entry registration of transactions. Six main flows related to food systems are considered (Figure 1).

FIGURE 1

### Flow of Funds for Food Systems



Source: Díaz-Bonilla, Swinnen, and Vos (2021) and Díaz-Bonilla (2021a)

<sup>1</sup> Special Advisor of the Director General of the Inter American Institute for Cooperation on Agriculture, IICA. The background paper is based on previous work done at IFPRI: Díaz-Bonilla E. (2021a and 2023); Díaz-Bonilla et al. (2021); Díaz-Bonilla and Echeverría (2022); Díaz-Bonilla et al. (2022).

<sup>2</sup> Although it does not follow a SAM approach, a comparable idea is used by the UNFCCC Standing Committee on Finance to estimate climate funding (see UNFCCC 2021).



Two of those flows of funds are “internal”<sup>3</sup> to food systems. They include food and food-related expenditures by consumers (first flow), which in turn constitute the sales/revenues and, hence, they finance current expenditures, investments and profits/savings of farmers, agri-food business operators, and other economic actors in food systems (second flow; includes the intra-flows between different subcomponents of the value chains). The other four flows are “external”<sup>4</sup> to food systems, encompassing international development finance (concessional and non-concessional loans, grants, and other financial support from multilateral financial organizations and development banks, bilateral aid agencies, and philanthropic groups); national government budgets (expenditures and revenues); banking system operations; and capital market finance. Each flow is guided by decisions taken by different types of actors (with further subdivisions within each one of them) and therefore the actions and interventions needed to reorient and scale them up to finance the transformation of food systems would be different.

#### FINANCING OF WHAT?

Other background papers and sections prepared by the FSEC discussed the objectives for the desired transformation of food systems and the associated incremental costs related to public interventions (used in general to refer to policies, programs, investments, expenditures, taxes and subsidies, laws and regulations, and institutional aspects) or private actions (basically consumption and production decisions) necessary to achieve those objectives. This paper takes those estimates as given, and then looks at the possible ways of financing the costs of what needs to be done by public and private actors involved in food systems.

To have a sense of the financial effort needed to fund the additional estimated costs, it is necessary first to consider the value size of the current flows related to food systems. Looking at the different financial flows it can be assessed whether they are currently supporting activities that help to achieve that transformation, are neutral, or are detrimental to the desired objectives, opening the possibility of reallocating some of them.

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<sup>3</sup> The word is used with quotation marks because although the flows are “internal” to the food systems, the latter may include domestic and international components, and therefore those flows may cross frontiers.

<sup>4</sup> The word is with quotation marks not only because the reason mentioned before, but also because while some of the flows, such as public expenditures or a bank loan as sources of funds are external to food systems, there are also taxes that the operators within food systems have to pay to the government, and the loans should be repaid, all of which comes from the financial flows internal to food systems.



However, there is not now a complete view of all the financial flows related to food systems, either at the global level, or for specific countries. One of the lines of work by the UNFSS Hub<sup>5</sup> is precisely to estimate those current flows, starting with country pilots.

There are nevertheless partial estimates for components of food systems or for specific topics at the global level and with some geographical disaggregation, such as those in Díaz-Bonilla (2021a and 2023) for flow of funds related to SDG2, and Díaz-Bonilla and Echeverría (2022) for certain climate financing aspects oriented to food systems. Both studies also include broader estimates of the flows of funds involved that go beyond food systems, to gauge the outer boundaries of the potentially available funds, which although now would be going to other uses, could be eventually reoriented towards the desired transformation of food systems.<sup>6</sup> In any case it is necessary to consider the general and specific “budget constraints” that frame those options, based on double-accounting principles. This is necessary to avoid the common mistake of discussing “financing” as if there were some free funds in the economic system. In what follows, first the overall budget constraints are discussed and then there is an analysis of each one of the six flows.

#### OVERALL BUDGET CONSTRAINTS

Table 1 shows the incremental costs estimated by Passaro et al. (2023) for FSEC compared to the GDP, savings, and investment values at the global level and disaggregated by different groups of countries by income levels (year 2020 in current US dollars). Table 2 shows the incremental costs as percentage of GDP, savings, and investments.

Several points can be mentioned. First, while GDP is linked to all six flows, the saving/investment balance is related basically to banking systems and capital markets (which intermediate those flows). Second, the saving/investment balance at the global level is an overall “budget constraint” that cannot be exceeded at a point in time.<sup>7</sup> Third, the incremental costs do not seem a large percentage of GDP and savings/investments at the global level, and also in the case of high-, and upper-middle-income countries, suggesting that, at those levels of aggregation, there are enough potentially available funds to finance the additional activities. Fourth, the additional costs in the case of lower-middle income countries appear as a more substantial effort, but still manageable at less than 1% of savings and investment levels (Table 2). Still, this category has a large saving/investment gap in value (Table 1). Fifth, for low-income countries, however, the effort in

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<sup>5</sup> The UNFSS Hub was created by the UN Secretary General to coordinate the work of UN agencies (and engage with other international institutions) in support of specific national programs aimed at improving food systems. A specific working group (co-chaired by IFAD and the World Bank) focuses on financial issues (<https://www.unfoodsystemshub.org/>). The author is part of the advisory committee to that work, and IICA is supporting the work in countries in Latin America and the Caribbean (LAC).

<sup>6</sup> It should be noted that the flows are in total values while the costs have been estimated in incremental values.

<sup>7</sup> Of course, if there are idle factors of production then GDP may be increased which could lead to larger values of consumption and savings/investments. Or for a given GDP, consumption can be reduced, and savings/investments increased, with further rounds of general equilibrium effects.



terms of GDP, and particularly in relation to the saving/investment<sup>8</sup> is very large, suggesting that they will need strong outside support, particularly from the surplus savings particularly from high income countries, but also upper middle income<sup>9</sup> (Table 1, last column). Sixth, any reallocation of

TABLE 1

	Average annual cost (billion USD PPP) (2020)	GDP (billion USD PPP) (2020)	Savings (billion USD PPP) (2020)	Investments (billion USD PPP) (2020)	Savings minus Investments (billion USD)
High income	21.7	63282	14708	14041	667
Upper middle income	125.8	48241	17519	16704	816
Lower middle income	42.4	21532	4497	5786	-1289
Low income	25.4	1338	122	315	-193
World	215.3	134392	36846	36846	0

Source: costs from FSEC's estimates; author's estimations based on World Bank WDI for GDP, savings and investments (normalizing data gaps so investments equal savings at the global level).

TABLE 2

	Incremental Costs/GDP (%)	Incremental Costs/Savings (%)	Incremental Costs/Investments (%)
High income	0.03	0.15	0.15
Upper middle income	0.26	0.72	0.75
Lower middle income	0.20	0.94	0.73
Low income	1.90	20.79	8.05
World	0.16	0.58	0.58

Source: Author with data from Table 1.

Those are the incremental costs estimated by FSEC related to the operation of food systems, but without including safety nets to support incomes of the poor and vulnerable. Separate calculations

<sup>8</sup> It should be noted, as mentioned, that not all additional costs will be intermediated by the banking system and capital markets in the saving/investment balance.

<sup>9</sup> China, which has been recently reclassified by the World Bank in that category, represents about 60% of the surplus of the group.



for the latter type of intervention estimate that some 290-300 billion USD (2020, PPP) would be needed annually, of which about 87% will be required for lower-middle income and low-income countries. This would imply that the incidence of the costs of safety nets as percentage of the GDP, savings, and investments in those groups of countries would be 3-4 times higher than the percentages shown in Table 2.

#### GENERAL CONSIDERATIONS ABOUT INDIVIDUAL FLOW OF FUNDS

Those aggregate values need to be further disaggregated considering the different types of flows, as well as the nature of the activities considered, because the latter influences whether the funding comes from domestic or international sources, which also may be from the public or private sectors. For instance, some activities may have to be financed by the cash flow of the private economic agents within the food systems (the internal flows), while others could be funded by the governments and/or international development funds or may need loans from the banking system or investments from operators in capital markets.

Therefore, besides the GDP levels and the savings/investment balance discussed in the previous tables, a further analysis should look at the current values of the six different flows and compare them to the type of activities to be financed. This is because the nature of those public and private activities that define the additional costs also helps to indicate what would be the type of flow of funds involved.

Table 3 presents just an example among possible options, marking with “X” what type of flow could be involved in the different activities considered by FSEC in the estimation of the incremental costs of the transformation.

Obviously, these are just examples. The specific percentages of the costs allocated to each flow depend on the particular conditions in individual countries and on the public instruments and private activities considered. For instance, in the costs related to “Diversification of protein supply” it may be assumed that part of the costs is financed by the economic agents in food value chains, but that producers may also need to ask for loans from the banking system and/or investments from capital market operators. In the case of “Behavioural interventions for shift in demand” the table considers expenditures by economic agents in food value chains as well as governmental interventions. While for “Child nutrition” and “Restrictions, taxes and regulations” governmental funds may be more important. Also, in the case of “Cash transfers” and “Training of smallholder farmers” the government budget (perhaps also financed by international development funds) may be more relevant. But in the case of “Rural infrastructure development” and “Financing for smallholder farmers” also the banking system and capital markets may participate.



TABLE 3

	Average annual cost (billions of USD)	Internal Flows	International Development Funds	Public Budgets	Banking System	Capital Markets
<b>1. Consumption of healthy diets by all</b>						
Diversification of protein supply	3.1	x			x	X
Behavioural interventions for shift in demand	1.2	x		X		
Child nutrition	17.2		x	x		
Restrictions, taxes and regulations	1.1	x		x		
<b>2. Strong livelihoods throughout the food system<sup>10</sup></b>						
Rural infrastructure development	23.6		x	x	x	X
Training of smallholder farmers	1.3		x	x		
Financing for smallholder farmers	6.1		x	x	x	X
<b>3. Protection of intact land and restoration of degraded land</b>						
Protection of forests and other ecosystems	77.7	x	x	x		X
Management of forests and other ecosystems	3.4	x	x	x		X
Restoration of forests and other ecosystems	6.7	x	x	x		X
<b>4. Nature-positive production throughout the food system</b>						
Reduction of emissions	27.6	x	x	x	x	X
Improvement of emissions' sequestration	41.8	x	x	x	x	X
Reduction of food loss and waste	1.7	x		x		
Agriculture public R&D	2.9		x	x		
TOTAL	215.3					

Source: first column is from FSEC estimates; the other columns are by the author, based on Díaz-Bonilla, 2021a

Further, the allocation of the interventions and activities may depend on the type of instrument: for instance, financing the application of agricultural technologies may have to come from the banking system (and perhaps from capital markets); but the government may decide to use an instrument that combines the use of cash transfers based on poverty with grants linked to productive activities, environmental sustainability, and similar activities in support of small farmers (Díaz-Bonilla, 2021a). In that case, the additional costs of improved technologies will be financed by grants from the public sector, instead of loans from the banking system. Also, the use of capital markets will depend on the investable vehicle: social, green and sustainability bonds may finance public sector expenditures

<sup>10</sup> As noted before, FSEC did a separate estimate of the cost of safety nets.





as well as some private companies, while impact investment funds and similar vehicles, will go basically to private economic agents in the food value chains.<sup>11</sup>

The next paragraphs and tables give some idea of the orders of magnitude of current funds for some of the flows, based on Díaz-Bonilla, 2021a and Díaz-Bonilla and Echeverría, 2022. As mentioned, there are no estimations for food systems as a whole; that work is being undertaken by the financial groups of the UNFSS Hub with support from other institutions.<sup>12</sup> Therefore, after looking at overall budget constraints (as done in the previous section) the next step in the analysis of the financing of food systems is to try to estimate the values of the individual six financial flows involved. Further, once having an estimate of the current financial flows, an additional step would be to try to understand the nature and impact of the activities financed: are they helping, hindering or are neutral regarding the desired transformation? That analysis should help determine the amount of available financial resources; whether some of them can be reallocated toward the desired objectives; and, if that is not enough, where the additional money may come from, considering the overall availability of financial resources (“budget constraints”). However, in terms of analysis of financial flows, the international community and individual countries are mostly still at the previous level of trying to estimate the current values of financial flows for food systems.

In any case, a crucial consideration for the (re)orientation of the financial flows towards the activities that generate the desired transformation of food systems is to have an adequate overall incentives framework, including appropriate macroeconomic policies and a supportive business environment. Also, more specific policy and incentives frameworks for each flow will be needed to achieve the desired objectives. The next sections briefly discuss available data about financial flows and consider ways to redirect and scale them up.

## INTERNAL FLOWS

Table 4 shows again the incremental costs and an estimate of the total value of food consumption in 2020 USD.

As noted, the value of food consumption is basically<sup>13</sup> the source of the direct income of all the operators within food value chains, which fund their overall expenditures (current outlays and investments) and generate their profits/savings. If all the incremental costs shown in the first

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<sup>11</sup> The definitions and metrics for some of the operations in capital markets, such as ESG investments, impact investments, green/social/sustainability bonds, and similar topics, are evolving. This fact also complicates the collection of data for those financial operations.

<sup>12</sup> As noted, IICA, the institution with which the author is affiliated, is a partner in that work, collaborating with overall methodology and pilot cases.

<sup>13</sup> Food operators may have other sources of cashflows/incomes from governmental subsidies, financial investments, etc. Some of these aspects are discussed below.



column of Table 4 had to be included in the cost of food for consumers,<sup>14</sup> then that would imply a modest increase of 0.5% in high-income countries, and a more noticeable, but still manageable, 3-4% at the global level and for middle income countries. Unsurprisingly, however, for low-income countries, if all the additional costs considered for that group were to be passed on to consumers, the impact would be large.

TABLE 4

	Average annual cost (billion USD)		Food consumption (estimates) (billion USD)	Incremental Costs/Consumption (%)
High income	21.7		4569.0	0.5
Upper middle income	125.8		3328.0	3.8
Lower middle income	42.4		1937.6	2.2
Low income	25.4		180.4	14.1
World	215.3		10015.0	2.1

Source: costs from FSEC's estimates; food consumption author's estimations using World Bank's WDI database

To orient and scale up these two internal flows in the direction of the desired objectives there are several possible policy interventions (Díaz-Bonilla 2021a, 2023; Díaz-Bonilla et al. 2021; Díaz-Bonilla and Echeverría 2022; and Díaz-Bonilla et al. 2022).

Regarding consumption flows, governments can try to redirect demand from obesogenic consumption and toward healthier and more sustainable diets by using taxes and subsidies, income support with a nutrition focus for the poor and vulnerable populations, nutritional information/education and regulations (e.g., labeling requirements, advertisement standards, and the like). Those interventions influence the consumer's food environment (including prices, incomes, preferences and the market structure that frame consumer decisions).

Regarding production, governments influence the decisions of those operators in food value chains, using regulations and controls related to health, nutrition, food safety, labeling, advertising and environmental aspects (such as deforestation or the reduction of food and losses). Governments also tax and subsidy activities, but not necessarily in ways that support the desired health and environmental objectives for well-functioning food systems. There are also regulations and controls related to labor conditions, competition, and other social objectives, such as stopping displacement of vulnerable communities from their land.

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<sup>14</sup> It should be noted that some of the activities considered in Table 3 may increase productivity and therefore reduce the cost of food (or increase profits of the food chain operators). Assuming, like in the previous paragraph, that all the costs are reflected in higher food prices paid by the consumer would then be an upper limit of the potential impact on internal flows.



Both for production and consumption decisions, but also for the other financial flows discussed immediately, it would be relevant to define net-zero emissions as policy targets, the pricing of externalities, the development of carbon markets and the implementation of risk disclosures (as suggested by the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board).

But financing the additional costs may imply not only redirecting current internal flows (for instance by shifting to the production and consumption of a healthier diet) but also incurring in additional expenditures by consumers and producers (because, following the example, those healthier diets are more expensive). Therefore, the mobilization of some or all of the external flows will be needed to fund the additional costs (as discussed in the next sections).

#### INTERNATIONAL DEVELOPMENT FUNDS

As mentioned before, international development funds (IDF) include concessional and non-concessional loans, grants, and other possible financial operations from multilateral financial organizations and development banks, specialized multilateral funds, bilateral aid agencies, and philanthropic funds. While in many cases the debate about “financing the transformation of food systems” focuses just on this type of flows, it is the smaller of all external flows (see Table 5).

TABLE 5

International Development Funds (billion USD)			
All sectors/purposes	Agriculture, forestry, fishing (AFF) (part of All sectors/purposes)	Total climate finance	Only AFOLU (part of Total climate finance)
2015-2020	2015-2020	2017-2018	2017-2018
269.0	12.0	84.2	9.1

Source: updated from Díaz-Bonilla 2021a, 2023; Díaz-Bonilla and Echeverría 2022. It should be noted that because data come from different sources and cover different years the values cannot be compared across categories.

Disbursements of international development money in current values have been close to 270 billion USD for all uses/sector (average of 2015–2020) and about 12 billion USD for agriculture, forestry and fishing (AFF), or about 4.5% of all development flows. Estimates for development flows (2017–2018) for all mitigation and adaptation activities were about 84.2 billion USD, of which about two thirds came from MDBs (based on detailed data from the Climate Policy Initiative, 2020). However, the share for mitigation and adaptation in agriculture, forestry, land use, and natural resource



management (AFOLU), was far smaller: about 9.1 billion USD, and again multilateral development banks accounted for over two-thirds of that total (CPI (2020) and its database).<sup>15</sup>

There are no estimates of the total amount of international development financing supporting food systems in general. Currently the financial group of the UNFSS Hub is piloting country studies to estimate those flows using OECD data.

As in other flows, a first question is whether current funds are financing the desired activities and objectives, or, if not, whether they can be reallocated towards those ends and away from other uses. For example, some of the IDF may be still supporting investments with high green-house gas (GHG) emissions, such as coal-based energy (UNFCCC 2021). Similarly, there may be other funds that can be reallocated from activities with lower priority or impact.

If the reallocation is not enough to fund the desired activities, then there are two other options: one is trying to increase/scale up the IDF; the other is to use them more strategically to mobilize additional resources from the private sector.

The possibility of scaling up those funds faces different constraints, depending on the type of IDF. MDBs may be restricted by their capital base and financial policies that limit their leverage. There are current discussions about increasing the leverage by changing financial policies (which requires negotiations with rating agencies to adjust risk parameters to allow for increased lending in the context of the pandemic and other shocks; see Díaz-Bonilla 2020); alternatively, the capital base would have to be increased with unchanged financial policies; or some combination of both. In turn, bilateral aid is limited by fiscal constraints and political issues, while philanthropic funds depend on underlying endowments.

In addition to the IDF in table 5 it is also relevant to consider better uses of the International Monetary Fund's Special Drawing Rights (SDRs) (the new issuing was about 650 billion USD, of which about 60% has gone to developed countries that do not need these funds; it adds to the previous issuances a significant portion of which is held by developed countries that do not need them). The discussion at the IMF has been about reallocating a share of them to developing countries to finance mitigation and adaptation activities, and a Resilience and Sustainability Trust was approved. However, not all developed countries have allocated SDRs to the RST or other developmental uses.<sup>16</sup> Further, there are other options with larger multiplier impact (i.e. volume of lending by unit of SDR) that should be explored, such as the proposals in Díaz-Bonilla, 2021a, 2021b, and von Braun and

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<sup>15</sup> Multilateral climate funds (such as the Global Environment Facility, the Green Climate Fund, the Special Climate Change Fund, the Least Developed Countries Fund, the Adaptation Fund, and others), provided just 3 billion USD annually for all activities, of which less than 0.8 billion USD was for AFOLU (Díaz-Bonilla and Echeverría 2022, based on CPI 2020).

<sup>16</sup> A smaller reallocation already happened to the IMF's Poverty Reduction and Growth Trust (PRGT), which provides concessional loans to low-income countries (<https://www.imf.org/en/About/FAQ/special-drawing-right>)



Díaz-Bonilla, 2021, to use a percentage to SDRs to set up a fund to guarantee the issuing by developing countries of zero hunger bonds or pandemic recovery bonds as perpetual bonds (see also other options in Persaud 2022).

In general, international public resources should also be used more strategically to leverage and mobilize the larger liquidity in global private financial markets. Blended and parallel finances, guarantees to de-risk specific projects and socially or environmentally themed bonds can support private investments that address larger humanitarian and development objectives. In addition, multilateral and bilateral organizations should better coordinate their own operations to avoid the fragmentation of relatively isolated initiatives and competition across international agencies at the national level.

## PUBLIC BUDGETS

Table 6 presents different estimates, compiled from different sources and covering different years, of overall public budgets and of certain selected components (therefore the numbers must be taken as illustrative and not added or compared across categories). Data is in current US dollars for the periods mentioned.

TABLE 6

	Total Government Outlays (Billion USD; averages 2014-2019)	Outlays for Agriculture, Forestry, and Fisheries (AFF) (Billion USD; averages 2014-2019)	Outlays for Social Assistance (Billion USD; averages 2014-2018)	Outlays for Climate Adaptation and Mitigation (Billion USD dollars; averages 2017-2018)	AFOLU (as part of the Outlays of Adaptation and Mitigation) (Billion USD; averages 2017-2018)	Fossil fuels (Billion USD; 2021)
Developing countries	8013.2	410.9	407.7	Na	Na	303.2
Developing w/o China	5026.2	125.1	260.9	Na	Na	Na
Developed	19044.8	136.9	Na	Na	Na	151.6
Total	27058.0	547.8	Na	58.8	4.1	454.8

Source: from Díaz-Bonilla (2021a) and Díaz-Bonilla and Echeverría (2022) and the sources mentioned in those publications. Fossil fuels subsidies are the explicit outlays from Parry et al. (2021), not considering tax exemptions.

The 215.3 billion USD of total additional costs estimated by FSEC (if they were all financed with public money) are less than 1% of total government expenditures of the period considered and the 194 billion USD of additional costs for developing countries represent about 2.4% of total



government fiscal outlays in those countries.<sup>17</sup> Table 6 shows the estimate in Díaz-Bonilla 2021a (current dollars for the period 2014–2018) of the programs more directly linked to poverty and vulnerability. They are financed by general revenues from the government and not by contributions from beneficiaries (therefore they are known as “non-contributory programs”), and include conditional cash transfers, unconditional cash transfers, social pensions, food programs, food for work and similar programs.<sup>18</sup> For the countries in the World Bank database from which this data is estimated (ASPIRE database), the median of social assistance expenditures is less than 1.2% of their GDP (Díaz-Bonilla 2021a). The separate estimates of the FSEC for the expansion of safety nets would imply about 5% of the GDP for low-income countries, and somewhat less than 1% of the GDP for lower-middle income countries, but less than 0.1% of the GDP for upper-middle income countries.

Besides the overall level, another key aspect to consider is the distribution across the population. Social assistance is intended for the poorest segments of a population, and if properly targeted, the largest percentages should go to the poorest quintile, with no benefits accruing to the richest ones. However, Díaz-Bonilla, 2021a shows that there seem to be significant problems with the targeting of these programs that are intended to help the poor and hungry. Therefore, many developing countries seem to suffer the dual problem of both lower levels of expenditure overall and ineffective targeting towards the poorest groups.

Regarding additional agricultural costs (such as those under “3. Protection of intact land and restoration of degraded land” and “4. Nature-positive production throughout the food system” in Table 3) if they are financed by the government budget (and assuming here just as a maximum estimate that the bulk of it is expected to occur in developing countries), this would imply an increase of more than 40% with respect of what is being spent now on AFF in developing countries (including China). It should be noted though that expenditures on AFF do not include other public expenditures relevant for agriculture, such as rural infrastructure, or for the food system as a whole. These considerations suggest the need to utilize a broader food-system focus to analyze the level and composition of public expenditures at the country level that are relevant for achieving the desired SDGs. This is also an exercise being conducted by the financial group of the UNFSS Hub with support from different institutions in Africa, LAC, and Asia.

An option to improve the expenditures for food systems is the repurposing the agricultural support measures (Laborde et al. 2020). It should be noted that the usual amounts discussed (about 600–700 billion USD per year), include trade protection that is not counted as expenditures in Table 6,

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<sup>17</sup> What is considered a “developed” or “developing” country varies across datasets. Therefore, the numbers presented must be considered approximations for those groups.

<sup>18</sup> Social assistance programs are part of the broader category of social protection programs, which include those financed by the beneficiaries (“contributory”). Developing countries spent about 1.1 trillion dollars (916 billion without China) in social protection (annual average 2010–2017; based on IFPRI’s SPEED database using data from the IMF), or about 3.5–4.0% of the GDP during that period



and that do not imply fiscal resources that can be allocated to other uses. Rather, much of that trade protection, particularly in developing countries, involve trade taxes that collect revenue. Also, there are expenditures for general services and for consumer protection, leaving only about 35%–40% for subsidies (concentrated in Europe and China) that could be repurposed toward the provision of environmental public goods and support of healthier and more sustainable diets. The total amount of agricultural subsidies (fiscal outlays) in developing countries (excluding China) is about 52 billion USD. Quantitative estimates of those potential reallocations show the possible complementarities across different SDGs, but also trade-offs, that must be considered in repurposing those expenditures (Laborde et al. 2020).

Table 6 also shows the presence of important fossil fuel subsidies (from Parry et al. (2021), using the explicit subsidies only<sup>19</sup>), of which developing countries represent up to 2/3 of the total. Those subsidies should be phased out according to the Glasgow Climate Pact agreed at COP26. If implemented, that would allow the reallocation of those funds to finance other uses, including food systems.

Overall, developing countries seem to devote comparatively few resources to crucial interventions for food systems, such as agriculture and social assistance (Díaz-Bonilla 2021a and 2023). Additionally, those expenditures need to be oriented towards public goods (in the case of agriculture) and improve their targeting toward poor and vulnerable populations (in the case of social assistance). Scaled-up investments in science and technology are also needed across the whole agri-food value chain and the consumer environment. A proposal recommends that national investments in these areas should reach at least 1% of food systems-related GDP (von Braun et al. 2021).<sup>20</sup> Díaz-Bonilla and Echeverría (2021) also showed that the levels of public expenditures for climate change adaptation and mitigation were low, particularly in relation to agriculture and related activities. At the same time, countries seem to be allocating too much to fossil fuels.

All that suggests the need to implement public expenditure and tax reviews in developing countries to increase and reallocate inefficient agricultural expenditures and fossil fuel subsidies and scale up, better target, and redesign social safety nets using new and evolving cash transfers that combine poverty, productive, nutritional, environmental, and financial inclusion components.

However, reallocating or repurposing, along with better targeting, even with improved instruments, may not be enough to reach the levels needed to achieve the desired transformation of food systems and, therefore, expenditures and revenues may have to be increased. This would require better tax administration and the revision of sales, income, wealth, and trade taxes, and the implementation of international initiatives to control corruption, tax evasion, and other practices

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<sup>19</sup> Adding an estimate of tax exemptions to the explicit subsidies, the total fiscal cost (expenditures plus lost revenues) may go up to about 826 billion USD at the global level (Díaz-Bonilla and Echeverría 2022).

<sup>20</sup> A traditional recommendation for R&D for the agricultural sector (not the whole food system) has been to invest at least 1% of the agricultural GDP. The suggestion mentioned in the text implies a larger number because it is based on the GDP of the whole food system.



that erode developing countries' tax bases. Pricing fossil fuel externalities should also be implemented.

Therefore, the fiscal analysis with a focus on the transformation of food systems should include not only expenditures but also revenues. Those fiscal reviews can help determine the adequacy of both the level and composition of public expenditures and taxes dedicated to food systems, as well as their effectiveness, efficiency, and equity for the desired transformation of food systems.

## BANKING SYSTEM AND CAPITAL MARKETS

These operations basically intermediate the savings and investment flows shown before (Table 1). It is important to distinguish stocks and flows. In several cases observers quote financial data in stocks, which usually are very large numbers. But what counts for the annual financing is the flows (see Díaz-Bonilla (2021c) for a discussion on some stock and flow confusions related to the pledges during COP26).

TABLE 7

Banking System (loans in billion USD)			
Total Loans	Loans to AFF	Loans to Climate finance	Only AFOLU (within Climate finance)
(2015-2019)	(2015-2019)	(2017-2018)	(2017-2018)
1600.0	24.0	205.8	7.1
Capital Markets (issuance in billion USD)			
Total Bonds	Total Equity	Green Bonds	Social Bonds
(2020)	(2020)	(2019)	(2020)
27300.0 a/	827.0	260.0	131.0

Source: from different publications referenced in Díaz-Bonilla (2021a) and Díaz-Bonilla and Echeverría (2022). a/ The estimated issuance of bonds reported for 2020 is gross new issues, which include roll over of previously issued bonds (i.e. those numbers are not net new issues).

Table 7 compiles data from different sources (mentioned in Díaz-Bonilla (2021a) and Díaz-Bonilla and Echeverría (2022)) and from different years (shown in the table below). It shows estimates of flows of loans based on the difference of stocks from one year to the next (Díaz-Bonilla 2021a).<sup>21</sup>

<sup>21</sup> The actual annual flow of loans for AFF may be larger, considering that some short-term credit may be extended and liquidated within the year, and thus does not affect stocks from one year to the next.





Again, the table compiles information from different sources and years just to give some idea of the orders of magnitude.<sup>22</sup>

For total credit, the yearly average change in stocks for 2015–2019 is about 1.6 trillion dollars globally; but the average for developing countries (excluding China) is only 87 billion dollars. The average annual change in loans for AFF during 2015–2019 is 24 billion dollars worldwide, but the estimated flows for AFF in developing countries would be around 14.2 billion dollars, or some 9.5 billion dollars if China is excluded (Díaz-Bonilla 2021a and 2023). The estimated additional costs include an annual flow of 6.4 billion in loans to small farmers (Table 3), which would be about 2/3 of the estimated loan flow in developing countries in Table 7. This would suggest the need of significant policy interventions related to the banking systems in order to get to that level (more on this below). Regarding operations in capital markets, Table 7 shows the issuing of new bonds and equity (from SIFMA 2022).<sup>23</sup> But the focus should be on socially- and environmentally-oriented investments.<sup>24</sup> Yet, as mentioned, definitions of these new investments are evolving, and therefore data on the actual volume of operations may not reflect an accurate picture of the levels of funding. Table 7 uses data from Díaz-Bonilla, 2021a (based on sources cited there) to show that the issuing of Green Bonds in 2019 was 260 billion USD and, of Social Bonds, some 131 billion USD in 2020.<sup>25</sup> However, the largest shares of investments in capital markets appear to take place in developed countries, and the amounts oriented towards agriculture and the transformation of food systems are small (Díaz-Bonilla 2021a and 2023; Diaz-Bonilla and Echeverria 2022). Of the sample of green bond issuers surveyed by the Climate Bond Initiative (2022), 26 countries have issued about 231 billion USD (covering up to the third quarter of 2022), but only about 10% was originated by developing countries (and China represented the largest percentage with about half of the total amount).<sup>26</sup>

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<sup>22</sup> Therefore, those estimates should not be added. Also, there may be some double counting, such as what is in AFOLU for climate change and what is general financing to AFF.

<sup>23</sup> It should be noted that the issuing of bonds in 2020 seems larger than the available global savings during that year. This is because a relevant part of the new issues of bonds replaces old bonds when they are due (this is particularly true in the case of public sector bonds). Therefore, the net issuance is far smaller. However, the author has not found reliable data on net new issuances.

<sup>24</sup> In a separate and not published work, the author also included an estimate of foreign direct investments (FDI) for AFF and Food, Beverage and Tobacco, using FAOSTAT and UNCTAD data. They are not reported here because the data has currently a limited coverage. Also, FDI for agriculture and agro-industries, in the aggregate, is part of the internal flows within food systems, even though for individual countries, they can be considered external financing.

<sup>25</sup> Aimed, respectively, at specific environmental and social objectives. When both objectives are combined, they are called sustainable bonds. There are also other themed bonds, such as “blue bonds” for sustainable fisheries.

<sup>26</sup> Over the years, there have been several green, social, and sustainability bonds issued by MDBs, such as the Inter-American Development Bank (IADB, 500 million dollars in 2014), the African Development Bank (AfDB, 600 million euros in 2017, and 1250 million in 2018), (iiLAB, 2018). But in general, the allocation to projects and activities related to the transformation agri-food systems is limited. Also, the money from the bonds



Although the banking system and capital markets are considered as potentially very significant sources of funds, there is not sufficient information on the level of funding from those sources to food systems, although the existing partial information suggests that financing for the transformation of food systems is limited. Further, it has been argued that banks and investors continue to finance fossil-fuel operations and activities linked to deforestation (UNFCC 2021), among other negative activities for the desired transformation of food systems. As in the case of the previous flows discussed, eliminating negative uses for those flows may help to finance other activities.<sup>27</sup>

The challenge is to mobilize these resources for investments in support of the transformation of food systems and particularly for developing countries.

Expanding the current levels of funding from banks and investors for the transformation of food systems requires understanding and lifting the systemic barriers that limit the supply of financial sources and services, particularly for agriculture, small farming enterprises and SMEs in food systems, and the poor and vulnerable (women, disadvantaged ethnic groups, and youths).

A starting point was already mentioned: the need for an adequate macroeconomic, regulatory and incentives framework. Lending to the agricultural sector is affected by macroeconomic volatility, and by regulations that are designed for the urban sector and for activities with more regular cash flows than agriculture, and that need to be revised. Policies requiring disclosure of climate related risks could make banks and investors steer away from operations leading to high GHG emissions. Also, legislating net-zero emissions targets, pricing externalities, and developing carbon markets, can guide the necessary financial flows.

In the banking systems the main issues to be addressed include the sources of funding, the types of institutions, and the lack of adequate financial instruments. Regarding sources of funding, central banks, framed by appropriate monetary programs that address inflationary objectives, can issue dedicated lines of credit to financial entities, which in turn can finance loans for the transformation of food systems, targeted to small farming enterprises and SMEs, including women and youth, in food value chains. Using central bank discounts to finance credit lines for agriculture was the norm in many developing countries until the policy changes of the 1980s and 1990s (see a more detailed discussion in Díaz-Bonilla (2015)).

With respect to institutions, well-managed public development banks, which already are key contributors to agricultural and climate finance, can be important instruments for addressing market failures that affect financial markets in relation to those activities and sectors. But to fulfill

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goes to finance their own lending operations which are already counted in the development flows discussed before.

<sup>27</sup> The comment refers to the reallocation of flows. Some of debates focus on divesting from existing investments (a stock variable), but that entail different issues, including the distinction between the physical investment and the financial instrument, and should not be confused with the redirection of flows (see Díaz-Bonilla, 2021c).



that role, public development banks need to operate with the adequate incentives, performance metrics and controls that would help to avoid the problems of the past in this type of institutions that led to their scaling down and even elimination in the 1980s and 1990s (Díaz-Bonilla 2015).

For financial instruments continuous innovation is needed, both on the lending side, and for savings and other financial services used by actors along the food value chain (a detailed discussion of instruments is in Díaz-Bonilla 2021a and 2023; Díaz-Bonilla and Fernández 2019). A crucial aspect of the design of the instruments is related to the level of transaction costs: small farmers, SMEs in food value chains, and some more vulnerable operators, may not be in positions to comply with all the steps needed to accede to loans and other financial instruments. Also, for banks, the transaction costs related to those operators and to some new lines of credit (such as for climate change mitigation or adaptation) may lead to the no utilization of available funds. There are different ways to address those problems: one is to design simpler financial instruments; another is to use public money to subsidize transaction costs in banks; and yet another is to have a separate cadre of extensionists able to help poor and vulnerable operators in food value chains to prepare bankable projects and complete the needed paperwork. Digitalization and education for financial literacy can also help (see Díaz-Bonilla and Fernández-Arias, 2019; and Díaz-Bonilla E, Fernández-Arias E, Piñeiro V, Prato B, Arias J. 2019)

Regarding capital markets, in addition to the overall incentive framework mentioned above, a further imperative is the development of a robust pipeline of investable opportunities with the right risk/reward profile (including individual projects, impact investment funds, green bonds and other instruments). To do that it was suggested establishing one or several dedicated project preparation/incubation/acceleration facilities (Díaz-Bonilla et al 2018, Apampa et al 2021). Another proposal to mobilize private funds in capital markets is the use of SDGs to guarantee zero hunger and pandemic recovery bonds to finance related public programs (Díaz-Bonilla, 2021a, 2021b, and 2023; von Braun and Díaz-Bonilla, 2021).

## CONCLUDING REMARKS

The previous sections discussed general availability of funds and ways to scale up and reorient those flows. It looks like, given the additional costs estimated, aggregate financial resources exist for the transformation of food systems even though their actual use for that purpose is not known. Better data is needed on current levels of financial flows and their uses (positive, neutral, negative). As noted, the UNFSS Hub is working on several aspects of developing the required data, particularly at the country level.

At the same time, to mobilize the existing funds many things need to be aligned, starting with an adequate macroeconomic and overall incentive framework to guide consumption and production decisions (the internal flows) and also (re)orient and scale up external flows. Besides the overall framework, the paper mentioned a variety of possible policy interventions that will be needed to mobilize, reorient, and increase the different flows.



However, whether the potentially available financial resources are sufficient or not, cannot be judged solely at the aggregate level or considering categories of countries; rather, their availability must be assessed in each individual country. And even if the domestic resources exist and can be mobilized, they need to be applied to operational programs for the transformation of food systems. Countries need to have the institutional arrangements to design and implement comprehensive plans/programs for the transformation of food systems, articulating the National Pathways delineated at the UNFSS and the National Determined Contributions (NDCs) and the National Adaptation Plans (NAPs) of the Paris Agreement within the negotiations under the UNFCCC.

The UN secretary-general announced at the UNFSS the creation of a UN coordination hub in Rome (including the financial group co-chaired by IFAD and the World Bank) and the appointment of UN country coordinators to help manage the work of the UN organizations around national programs of food systems transformation. Of course, such coordination must extend beyond the agencies of the UN system.

Most important, the work on food systems must be guided by national governments: it is crucial that developing countries structure their own multistakeholder consultation operational mechanisms to support the design, coordination, financing and implementation of their national plans and programs. Developing countries could benefit from the establishment of international mechanisms to help them do that.

Those plans/programs need to consider the interventions to confront current shocks, as well as those related to the transformation of food systems. It would be useful to have a standardized common policy template for that exercise, considering Objectives, Policy instruments, Technology, Costs, Financing, Institutional arrangements, and Monitoring and evaluation arrangements.

In Díaz-Bonilla 2021a, it was suggested that a Zero Hunger Alliance and Fund be established, with the objective of operating as an international mechanism to assist the developing countries that formally join that Alliance in the design, financing, and implementation of their zero hunger plans. That idea can be expanded to the transformation of food systems to address both the UNFSS and the UNFCCC tracks.

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