Climate finance under a CGE framework: decoupling financial flows in GTAP database

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ABSTRACT

Climate finance flows include the investments required to limit global warming and to adapt to climate impacts. Recent advances in Computable General Equilibrium (CGE) model hybridization techniques provide the necessary path to explore climate finance flows, in particular, a more detailed representations of the energy sector through soft-linking procedures with bottom-up models. This paper proposes a method to disaggregate capital flows from the current account balances in the GTAP database. The impacts of different greenhouse-gas (GHG) emission scenarios on green capital allocation can be tested. This is a particularly interesting feature, not only because it can help tracking climate finance in an stylized way, but as a way of exploring the soft linking procedures between CGE and bottom-up models.

***Keywords*—climate finance; green capital; investment**

I. INTRODUCTION

In 2015, 170 of the 197 parties of the United Nations Framework Convention on Climate Change (UNFCCC) agreed to hold the increase in the global average temperature to well below 2C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5C above pre-industrial levels [1].

The Decision 01/CP.21 of March 2016 (or the Adoption of the Paris Agreement) defined activities and tasks to be undertaken by various bodies, including common efforts on Mitigation, Adaptation, Loss and Damage, Finance, Technology development and transfer, among others [2]. The finance related activities are derived from the Article 9 of the Paris Agreement. It states that *developed country Parties shall provide scale-up financial resources to assist developing country Parties with respect to both mitigation and adaptation*.

Climate finance flows include the investment required to limit global warming and to adapt to climate impacts. According to the Paris Agreement, the UNFCCC financial mechanism shall serve as the instrument for these flows to happen transparently, with consistent information being provided biannually by the Parties [1]. The Agreement does not mention any criterion of how climate finance (i.e., the capital flows) must be distributed among countries. The Intended National Determined Contributions (INDCs)[3] could be a criteria for that? Or are there other possible criteria? Several questions arose on how the path determined by the Agreement can be achieved or how the NDCs will be implemented and financed [4].

Climate finance is regarded as an opportunity to address sustainability, changing development patterns towards long-term *green growth*, and avoiding a lock-in of carbon intensive energy infrastructures [5]. An average of $410 billion dollars was disbursed as climate finance, in 2015/2016, mostly directed to mitigation activities (93%), followed by adaptation (5%) and dual benefits / REDD activities (2%) [6].

The amount of investment required to meet energy demand within a credible emissions framework varies but could reach up to US$53 trillion by 2035 [7]. The investment would come from private finance (carbon markets, Foreign Direct Investment, donations and other flows, such as REDD+) and from public institutions through bilateral (Official Development Assistance - ODA, Other Official Flows - OOF and export credits) or multilateral flows.

Moreover, most of the investment would come from private flows. Thus, energy and climate policies must incorporate the financial aspects, such as the role of capital markets [8]. The financial sector provides payment, debt and insurance services, reducing exposure to risk of the economic transactions. In addition, the creation of instruments to operate commodities future markets and financial intermediation between savers and investors play a crucial role in capital allocation of any modern economy.

In this regard, a feature less explored in the literature of Computable General Equilibrium (CGE) models is the link between the real and the financial sides of the economy [9]. [10] summarizes the first advances on financial models applied to CGE frameworks – especially focused on income distribution, a theme of great concern at the time. For instance, this is the case of [11], that applied a financial CGE (FCGE) to assess Ecuador's economic stabilization programs, and [12] that incorporate the role of credit for capital and investment.

[13] highlights that there were few developments on financial linkages in macroeconomic models applied to climate policy – the UN Global Policy Model (GPM) [14] shows some applications on climate policy, but the authors argue that it does not go into sectoral detail – so that the treatment of the financial sector is therefore done by assumptions.

More recently, [15] and [16] applied the modeling framework described in [17] to assess the impacts of financial regulation in Australia and in the United States. However, none of these studies is related to climate finance. One of the first studies to approach climate finance within a FCGE framework is [18], that presents a case study on green credit policy for China. The study is based on the FCGE model presented in [19], that analyzes the effect of oil shocks also on the Chinese economy.

The links between the financial and the real sides of the economy can be more fully explored within CGE model's framework. The recent advances in CGE model's hybridization, including the more detailed representations of the energy sector, provide the necessary path to explore climate finance flows in CGE models. Based on this, this paper contribution is to propose a method to disaggregate capital flows from the current account balances in GTAP database. Doing so, it can provide a way to assess the investment flows required to mitigate climate action (climate finance) in the CGE models. The next section describes in more detail the methodological steps, the databases used and preliminary results on tracking climate finance in the GTAP database. Section 3 presents the tool used – the Total-Economy Assessment (TEA) model – and describes the ongoing efforts on disaggregating another form of capital, green capital, hereafter defined as the capital stock invested in climate change mitigation activities. Section 4 ends the paper with final remarks, caveats and the next research steps.

II. Net capital inflows and climate finance

The flows of economic transactions that occur within an economy are represented in the Social Accounting Matrix (SAM). In SAM, macroeconomic equilibrium implies an equality between the current account balance and the inflow and outflow of a country's foreign currency. These flows include investments in financial assets (stocks, public and private debt, securities, etc.) and direct investment – i.e., net capital inflows equal the current account balance. Climate finance flows are included in these investment flows, although they are not explicitly represented, the same applying to the monetary sector, that does not have an explicitly representation in the SAM.

In addition, the development of financial matrices (FSAM) is currently on a country level basis. A literature review, including the GTAP database, reveals few ongoing efforts in that direction [19], [17], [14]. Thus, a global database including the financial sector at a country level and reconciliating it globally is not in perspective. Suffice to say that this is a task of high complexity.

One possibility to investigate climate finance flows, overcoming these (data disaggregation) caveats, is trying to identify these flows under the equality between the current account balance and the inflow and outflow of a country's foreign currency. These flows, i.e., the net capital inflows at a country level, are represented by the parameter vb(*) and can be obtained in the GTAP9 database [20].

Hence, to achieve the same regional aggregation of the TEA model[1] (described in more detail in the next section), the net capital inflows of the GTAP9 database were aggregated into 18 regions. Figure 1 shows the regional capital inflows in the base year 2011[2]. In Figure 1, the regions in red have negative net inflows of capital (i.e., current account surplus), while the regions in blue show positive net inflows of capital, which are used to finance their current account deficits. For instance, Middle East (MEA) and China (CHN) have the highest current account surpluses, while the United States of America (USA) and India (IND), the highest deficits.

Tracking climate finance is not a simple task. Although some flows – usually, public – are tracked by international institutions, like UNFCCC and OECD, most of the flows regarded as climate finance are private and not tagged. Moreover, in many cases, climate finance is directed to projects with broader goals and there is not a precise method to account for the value of the

[1]AFR (Africa), AUS (Australia and New Zealand), BRA (Brazil), CAM (Central America), CAN (Canada), CAS (Caspian Region), CHN (China), EEU (Eastern Europe), IND (India), JPN (Japan), KOR (South Korea), MEA (Middle East), RAS (Rest of Asia and Oceania), RUS (Russia), SAF (South Africa), SAM (South America), USA (United States) and WEU (Western Europe).

[2]For a detailed representation of the net capital inflows at country level, please see Table A.1 in the Appendix.

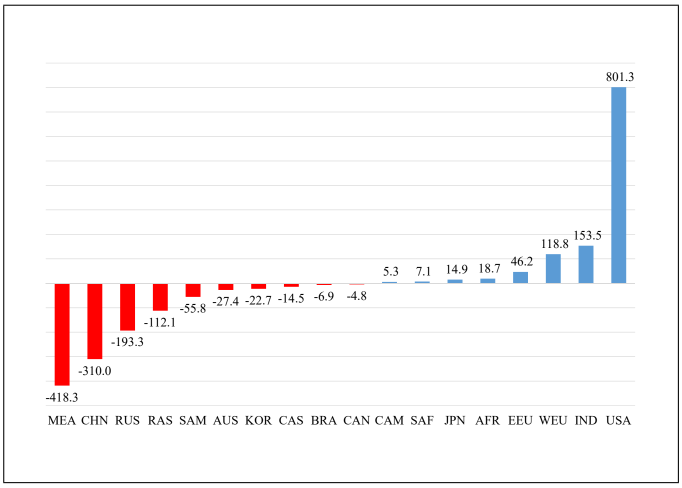

Figure 1. Capital flows in TEA regions – year 2011. Values in USD billions

Source: own elaboration based on [20]

mitigation and/or adaptation part of these projects [21]. For instance, applying the Rio Marker[3] methodology might overstate the results of climate finance flows, because it accounts for objectives other than climate change and there might exist overlapping activities (e.g. desertification and climate change). Thus, improvements on the measurement, reporting and verification (MRV) systems on climate finance are required [23], [21].

Once the net inflows of capital of the GTAP database were aggregated, the second step was to identify the climate finance within the net inflows of capital. Data for climate finance was gathered from different sources. The major data sources include the Climate Policy Initiative – CPI reports *The Landscape of Climate Finance* [24], [25], the UNFCCC *Submitted Biennial Update Reports from Non-Annex I Parties* [26] and the OECD Stats for ODA, OOF and private flows by country and region [27].

In this second step, regional aggregation becomes a drawback because data is not always comparable and complete. To avoid mis-comparison with the net capital inflows from the GTAP database, country level data from [27] was used and then aggregated into the 18 regions of the model.

Regarding the completeness of the information, [25] compiles the most comprehensive information of climate finance flows for the base year 2011. That includes [27] as a major source. Although [25] aggregates the flows in 10 regions, many of these regions refer to major recipient countries, like China, India and Brazil. These countries (and others) are treated as separate regions in the TEA regional breakdown. Thus, whenever possible, data from [25] was used to cross-check the regional aggregation of the country level data from [27].

According to [25], in 2010/2011, climate finance reached on average USD 364 billion[4]. In 2010/2011, most of climate finance was directed to mitigation activities (USD 350 billion), specially for projects on renewable energy – wind and solar generation – and on energy efficiency in industry and buildings [25]. Moreover, according to [25], most of the finance comes from the private sector (USD 230 billion).

To estimate the climate finance flows in the TEA model, the average value of USD 364 billion [25] was disaggregated into the 18 regions of the model, according to the regional share of the ODA, OOF and private total flows in [27], as shown in Figures 5 and 6 in the Appendix. The estimates for the regional net climate finance inflows for the base year 2011, in USD billions, are shown in Figure 2 below. Negative values (in red) refer to donor regions, like Western Europe (WEU) and the United States (USA), while positive values (in blue) represent recipient regions, like Africa (AFR), Rest of Asia (RAS), China (CHN) and Brazil (BRA).

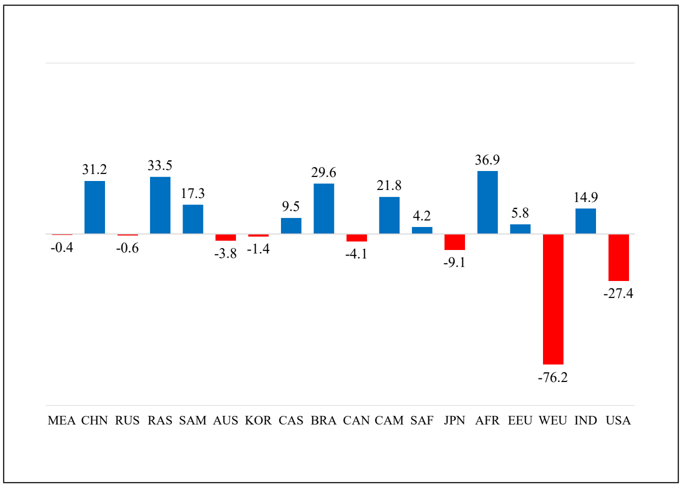

Figure 2. Climate finance flows estimates – year 2011 (in USD billions)

Source: own elaboration based on [24], [25], [27]

A possibility to enhance the analysis of global climate policies under an Integrated Assessment Model

[3]The Rio markers are statistical policy markers that cover the financial assistance for biodiversity, climate change adaptation, climate change mitigation and desertification activities. OECD DAC also uses a fifth environmental marker. For a more comprehensive explanation, please refer to [22].

[4]As a comparison, in the same period, [27] reports ODA, OOF and private total flows of USD 414.5 billion, of which USD 127.4 billion are tagged as climate change mitigation and adaptation

(IAM) framework[5] is to decouple green capital in the SAM/CGE framework. This debate leads to the third step of the methodology, which is an ongoing effort that is described in the next section, along with the tool to be used in the analysis, the TEA model.

III. TEA Model

TEA (Total Economy Assessment) is a multi-regional and multi-sectorial CGE model that tracks the production and distribution of goods in a dynamic recursive setup for the global economy. The model is based on the MIT EPPA model [29], [30] and on GTAPinGAMS [31].

The model is formulated as mixed complementary problem (MCP) and is solved through Mathematical Programming System for General Equilibrium – MPSGE [32] within GAMS. It assumes total market clearance (through commodity price equilibrium), zero profit condition for producers (with constant-returns-to-scale) and perfect competition to reach general equilibrium.

TEA includes a detailed representation of the energy sector. This representation is based on the COFFEE (COmputable Framework For Energy and the Environment) model [33], a partium equilibrium (PE) bottom-up model, that provides detailed technological information for the energy system. The soft-link with COFFEE improves energy system analysis, achieving a more comprehensive representation of the energy system. This feature is particularly interesting because COFFEE describes energy conversion technologies based on discrete techniques with pre-defined technological (size, lead time, efficiency, availability, etc.) and economic (overnight costs, fixed and variable O&M costs, contingency factors etc.) variables, thus capturing technological deployment over time in a least cost approach. The linking procedure between the models relies on base year data harmonization that includes:

- energy production and consumption (fossil fuel used in electricity generation, fuel plants energy consumption and non-energy use);
- explicit technological representation of nuclear, hydro, wind, solar and biomass sources;
- implementation of autonomous energy efficiency improvement (AEEI);
- share of power generation and energy trends; and
- GHG emissions (CO2, CH4 and N2O).

[5]IAMs assess the interactions between socioeconomic systems and energy and environmental processes. IAMs can develop emission scenarios, estimating the costs and benefits of mitigation policies and the economic impacts of climate change, combining different areas of knowledge [28]. IAMs are key to carry out scenario analyses under GHG emissions constraints. These models reflect with more accuracy the dynamics of different energy systems, including multiple aspects of energy transitions, such as water and land-use nexus.

Data for electricity generation (in energy physical units) and the shares of production factors (capital, labor, services, resources, fuel and land) are inputted into TEA in order to explicitly represent nuclear, hydro, wind, solar and biomass technologies. The production functions of these technologies were changed from CES to typical Leontief structures in order to facilitate that results from COFFEE could be completely embedded by the TEA model. Thus, the substitution elasticity between the different energy inputs is set to equal zero so that there is no substitutability between factors. The power generation branch has fixed input proportions and the penetration of different technologies carriers is determined by the COFFEE model.

Preferences and technologies are based on nested Constant Elasticity of Substitution (CES) functions. Representative consumers maximize welfare subject to budget constraint in each region. Such choices are determined by the parameters of substitution and transformation elasticities in the utility and production functions. Production functions follow a nested technological structure. For instance, the electricity production includes emission factors to account for the CO_2 emissions, the fuel used to produce electricity, capital (K), labor (L) and other fixed factors, as shown in Figure 3.

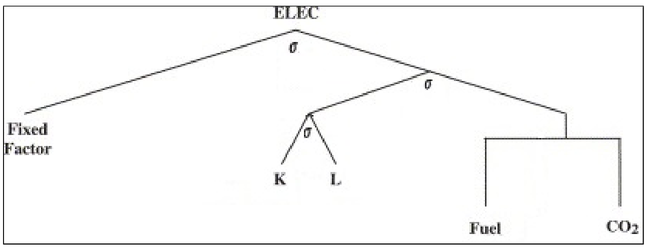

Figure 3. Electricity technological structure – fuel and emissions
Source: own elaboration

The CES functions describe the substitution possibilities between factors of production and intermediate inputs in the productive process, in a least cost approach. The CES production function can be expressed by the following Equation 1:

$$Y = A \cdot \left(\sum_{i=1}^{n} \beta_i X_i^{\rho} \right)^{\frac{1}{\rho}}, \tag{1}$$

where Y represents the output, A is a constant for productivity, β is the share of input i and X is the factor of production (capital, labor, resources etc.). The elasticity of substitution is a positive constant $s = \frac{1}{(1-\rho)}$. The CES production function leads to the linear production function as $\rho \to 1$, to the Cobb - Douglas production function as $\rho \to 0$, and to the production function with fixed proportions (Leontief) as $\rho \to \infty$.

TEA is designed to assess the evolution of the global economy from 2011 (base year) until 2100, at five-year intervals. The major data sources are the GTAP9 database [20], the International Energy Agency (IEA) reports of energy statistics [34] and the World Bank indicators [35], also a source for the GTAP database. Gross domestic product (GDP) follows the growth rates of the Shared Socio-Economic Pathway 2 (SSP2) – Middle of the Road [36], [37]. In the baseline, Total-Factor Productivity (TFP) is endogenoulsy target to meet the GDP. Labor supply follows SSP2 population growth rates [38]. Land productivity is assumed to increase exogenously, but no increase is assumed for labor and capital productivity. Regarding the TEA regional and sectoral breakdown, the world is divided in 18 regions (Figure 4) and in 16 sectors (Table I), respectively.

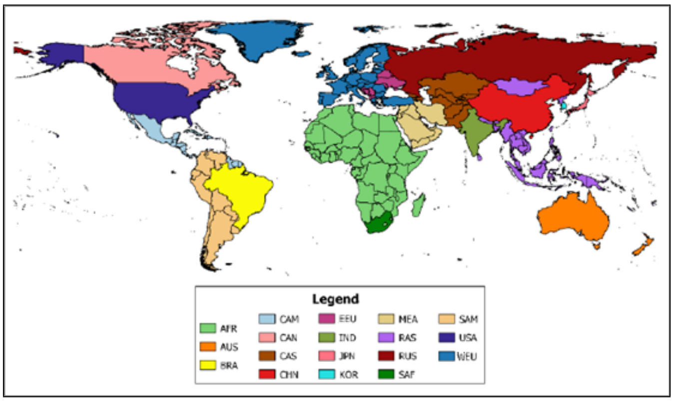

Figure 4. TEA regional breakdown[6]
Source: [33]

Demand for goods and services grows as income and yield increase. Baseline additional adjustments (structural changes) in long-term demand were made when necessary, usually, based on estimated curves relating GDP per capita and demand share. Hence, the shares of food and agriculture goods in final demand can be adjusted to capture long-term structural changes in preferences.

International trade follows an Armington's aggregation [39], in which a composite CES function differentiate consumer's preferences between imported and domestic goods. The macroeconomic closure assumes full employment of the factors of production. Savings equals investment in the general equilibrium, but regionally the imbalances are closed by a surplus (or deficit) in the current account. An endogenous real exchange rate clears the current accounts and the capital account decreases exougenously in the long-run.

[6]AFR (Africa), AUS (Australia and New Zealand), BRA (Brazil), CAM (Central America), CAN (Canada), CAS (Caspian Region), CHN (China), EEU (Eastern Europe), IND (India), JPN (Japan), KOR (South Korea), MEA (Middle East), RAS (Rest of Asia and Oceania), RUS (Russia), SAF (South Africa), SAM (South America), USA (United States) and WEU (Western Europe).

Table I
TEA SECTORAL BREAKDOWN

Sector	Code	Description
Agriculture	AGR	Agriculture crops and vegetables
	LIV	Livestocks
Energy	COL	Coal
	CRU	Crude Oil
	ELE	Electricity
	GAS	Natural Gas
	OIL	Petroleum coal products
Industry	I_S	Iron and steel
	CRP	Chemical rubber and plastic
	NMM	Manufacture of non-metallic mineral products
	MAN	Others manufacture
Transport	OTP	Transport nec
	WTP	Water transport
	ATP	Air transport
Services	SER	Services
	DWE	Dwellings

The TEA model allows for tracking foreign ownership of capital and investment behavior. The model can assume, in its macro closure, international capital allocation according to changes in regional rates of return [32]. Thus, the impacts of endogenous capital accumulation and the movement of investment between countries in response to differing expected rates of return can be tested. Capital stock evolves at each period with the formation of new capital that depends on the investment level in that period and the capital depreciation rate, as described in Equation 2.

$$K_{r,t} = I_{r,t} + (1 - \delta_r) K_{r,t-1} \tag{2}$$

where: $K_{r,t}$ is the capital stock in region r and time t; $I_{r,t}$ is the investment in new capital goods in region r and time t; and δ_r is the depreciation rate of capital in region r.

Hence, the third step of the methodology consists on creating a subset ("green capital") of the primary factor' set ("f"). That leads to a slightly different form of representing capital stock, especially regarding the role of investment in new capital goods (e.g., those related to climate change mitigation), as shown in Equations 3 and 4.

$$K_{r,t}{}^{cgds} = I_{r,t}{}^{cgds} + (1-\delta_r)K_{r,t-1}{}^{cgds} \qquad (3)$$

$$K_{r,t}{}^{cfin} = I_{r,t}{}^{cfin} + (1-\delta_r)K_{r,t-1}{}^{cfin} \qquad (4)$$

where: $K_{r,t}{}^{cgds}$ is the stock of capital goods (other than those climate finance tagged) in region r and time t; $K_{r,t}{}^{cfin}$ is the stock of green capital in region r and time t; $I_{r,t}{}^{cgds}$ is the investment in new capital goods (other than those climate finance tagged) in region r and time t; and $I_{r,t}{}^{cfin}$ is the climate finance investment in new capital goods in region r and time t.

Thereafter, in Equations 3 and 4, the sum of $K_{r,t}{}^{cgds}$ and $K_{r,t}{}^{cfin}$ must equal the capital stock ($K_{r,t}$) in Equation 2. Moreover, the depreciation rate is kept the same in both cases, but different rules for depreciating the green capital (e.g., in a policy scenario) could be thought.

For the base year calibration, the rule for assigning the stock of green capital is based on the flows described in Figure 2, which provides an explicit representation of climate finance capital for the base year 2011. Nonetheless, once implemented in the model, different rules for green capital allocation in the economy can be designed and tested. For instance, complementarity and/or substitution rules between green capital and the existing capital can be tested. Finally, testing for the impacts of different GHG emission scenarios on green capital allocation between regions is also possible. This is a particularly interesting feature, not only because it can help tracking climate finance in an stylized way, as discussed before, but as way of exploring the soft linking procedure between TEA and COFFEE models.

IV. Final remarks

The recent advances in CGEs hybridization, including the more detailed representations of the energy sector, provide the necessary path to explore climate finance flows in CGEs. This is an innovative topic that must be addressed by the research on climate change, methodologically, and under the recent directions on financial flows targeted by the Paris Agreement. The method described in this paper is expected to provide results on climate finance flows under a global CGE framework, that being the next step of this ongoing research.

Although it does not invalidate the method here proposed, the absence of climate finance data at a country level for the base year (2011) is one the limitations found in this study. Hopefully, the recent advances in the information systems on climate finance, specially through the UNFCCC biennial reports, can provide the necessary data for estimating other data points for recalibrating the base year, if necessary. Other limitation is data accuracy. Depending on the markers, flows might be overestimated. Thus, cross-checking information from different sources was crucial for dealing with this limitation.

Finally, a few attempts to express the financial sector in the SAM have been made so far in the literature. Financial SAM were built to express the capital and financial flows with greater detail, but at a country level. The development of a FSAM database – a task of high complexity – would be of great interest for the climate finance research community.

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Table A.1 (APPENDIX)
REGIONAL AGGREGATION FOR NET CAPITAL INFLOWS (VB)

Country	Region	vb	Country	Region	vb
Benin	AFR	6.41	China	CHN	-299.18
Burkina Faso	AFR	-1.08	Hong Kong	CHN	-10.84
Botswana	AFR	-2.45		CHN Total	-310.02
Cote d'Ivoire	AFR	-2.26	Albania	EEU	3.30
Cameroon	AFR	1.15	Belarus	EEU	10.67
Egypt	AFR	23.30	Croatia	EEU	1.74
Ethiopia	AFR	4.83	Ukraine	EEU	14.67
Ghana	AFR	6.71	Rest of Eastern Europe	EEU	3.61
Guinea	AFR	1.50	Rest of Europe	EEU	12.25
Kenya	AFR	7.56		EEU Total	46.24
Morocco	AFR	15.76	India	IND	153.46
Madagascar	AFR	0.29		IND Total	153.46
Mozambique	AFR	1.45	Japan	JPN	14.91
Mauritius	AFR	1.94		JPN Total	14.91
Malawi	AFR	0.48	Korea Republic of	KOR	-22.74
Namibia	AFR	-1.59		KOR Total	-22.74
Nigeria	AFR	-24.21	Albania	EEU	3.30
Rwanda	AFR	0.14	Belarus	EEU	10.67
Senegal	AFR	4.03	Croatia	EEU	1.74
Togo	AFR	2.51	Ukraine	EEU	14.67
Tunisia	AFR	3.08	Rest of Eastern Europe	EEU	3.61
Tanzania United Republic of	AFR	4.26	Rest of Europe	EEU	12.25
Uganda	AFR	0.48		EEU Total	46.24
South Central Africa	AFR	-26.15	India	IND	153.46
Central Africa	AFR	-14.33		IND Total	153.46
Rest of Eastern Africa	AFR	1.57	Japan	JPN	14.91
Rest of North Africa	AFR	-12.95		JPN Total	14.91
Rest of South African Customs Union	AFR	-0.96	Korea Republic of	KOR	-22.74
Rest of Western Africa	AFR	16.98		KOR Total	-22.74
Zambia	AFR	-3.08	United Arab Emirates	MEA	24.65
Zimbabwe	AFR	3.37	Bahrain	MEA	-3.26
	AFR Total	18.73	Iran Islamic Republic of	MEA	-69.98
Australia	AUS	-23.18	Israel	MEA	5.20
New Zealand	AUS	-4.18	Jordan	MEA	11.94
	AUS Total	-27.36	Kuwait	MEA	-80.62
Brazil	BRA	-6.94	Oman	MEA	-19.76
	BRA Total	-6.94	Qatar	MEA	-72.60
Costa Rica	CAM	-3.89	Saudi Arabia	MEA	-192.00
Dominican Republic	CAM	4.99	Rest of Western Asia	MEA	-21.84
Guatemala	CAM	3.94		MEA Total	-418.27
Honduras	CAM	0.94	Bangladesh	RAS	6.50
Jamaica	CAM	3.12	Brunei Darussalam	RAS	-4.42
Mexico	CAM	-30.36	Indonesia	RAS	-7.55
Nicaragua	CAM	0.64	Cambodia	RAS	0.96
Panama	CAM	17.96	Lao People's Democratic Republic	RAS	0.84
El Salvador	CAM	4.23	Sri Lanka	RAS	10.30
Trinidad and Tobago	CAM	-9.23	Mongolia	RAS	0.66
Rest of Central America	CAM	-0.26	Malaysia	RAS	-30.44
Caribbean	CAM	12.86	Nepal	RAS	4.17
Rest of South America	CAM	0.38	Philippines	RAS	19.08
	CAM Total	5.33	Singapore	RAS	-63.10
Canada	CAN	-4.80	Thailand	RAS	-6.87
	CAN Total	-4.80	Taiwan	RAS	-76.99
Armenia	CAS	2.13	Viet Nam	RAS	24.11
Azerbaijan	CAS	-19.69	Rest of East Asia	RAS	-5.47
Georgia	CAS	4.84	Rest of Oceania	RAS	12.63
Kazakhstan	CAS	-35.20	Rest of Southeast Asia	RAS	3.46
Kyrgyzstan	CAS	5.98	Rest of the World	RAS	-0.00
Pakistan	CAS	25.91		RAS Total	-112.14
Rest of South Asia	CAS	8.67	Russian Federation	RUS	-193.28
Rest of Former Soviet Union	CAS	-7.16		RUS Total	-193.28
	CAS Total	-14.53	South Africa	SAF	7.10
				SAF Total	7.10
					(...)

Appendix

Table A.1
Regional aggregation for net capital inflows (vb) (cont.)

(...)	Country	Region	vb
	Argentina	SAM	-13.42
	Bolivia	SAM	0.76
	Chile	SAM	-13.07
	Colombia	SAM	1.62
	Ecuador	SAM	2.31
	Peru	SAM	-9.05
	Paraguay	SAM	1.85
	Uruguay	SAM	1.17
	Venezuela	SAM	-27.97
		SAM Total	-55.79
	Puerto Rico	USA	5.62
	United States of America	USA	795.66
		USA Total	801.28
	Austria	WEU	-9.03
	Belgium	WEU	39.14
	Bulgaria	WEU	5.54
	Switzerland	WEU	-50.34
	Cyprus	WEU	3.89
	Czech Republic	WEU	-9.45
	Germany	WEU	-157.05
	Denmark	WEU	-17.22
	Spain	WEU	49.82
	Estonia	WEU	1.86
	Finland	WEU	6.29
	France	WEU	85.69
	United Kingdom	WEU	149.41
	Greece	WEU	45.28
	Hungary	WEU	-7.29
	Ireland	WEU	-80.97
	Italy	WEU	66.67
	Lithuania	WEU	6.64
	Luxembourg	WEU	8.30
	Latvia	WEU	4.68
	Malta	WEU	5.27
	Netherlands	WEU	-67.93
	Norway	WEU	-70.32
	Poland	WEU	28.37
	Portugal	WEU	12.24
	Romania	WEU	12.86
	Slovakia	WEU	1.84
	Slovenia	WEU	2.58
	Sweden	WEU	-29.39
	Turkey	WEU	77.79
	Rest of EFTA	WEU	1.26
	Rest of North America	WEU	2.41
		WEU Total	118.82

Appendix

Figures 5 and 6 show the share of total ODA, OOF and private capital flows donated and received from 2008 to 2017, respectively, according to the TEA regional breakdown.

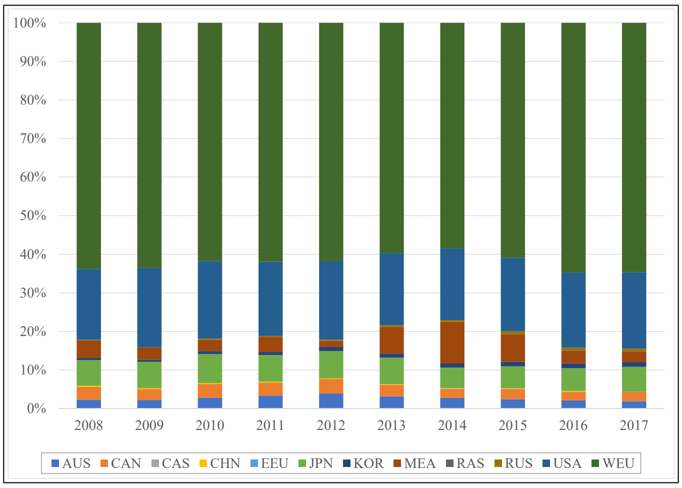

Figure 5. % Share of total ODA, OOF and private capital flows donated (2008-2017) – TEA regional breakdown.
Source: own elaboration based on [27]

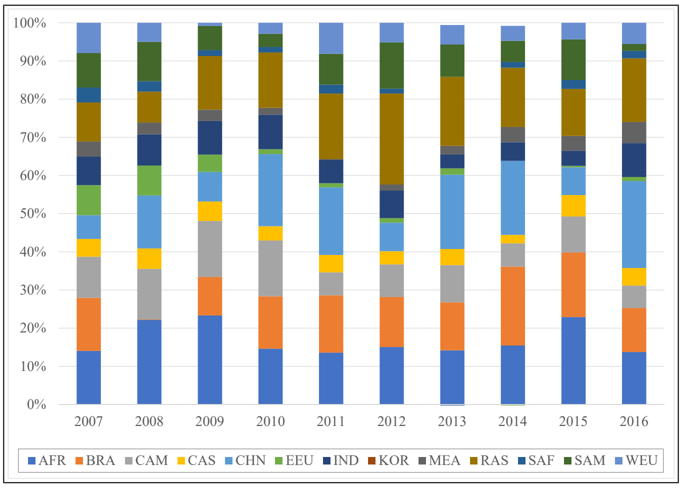

Figure 6. % Share of total ODA, OOF and private capital flows received (2008-2017) – TEA regional breakdown.
Source: own elaboration based on [27]