



Reforming VAT to boost repair services and the circular economy

Reformar el IVA para impulsar los servicios de reparación y la economía circular

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Abstract

The importance of repair and maintenance (R & M) activities that contribute to prolonging the lifetime of goods is highlighted as a key component in the transition to a sustainable circular economy (CE). The impact of Value-added Tax (VAT) on R&M activities is empirically analysed and a critical analysis of their tax treatment in the VAT Law (LIVA) and the existing tax benefit regime is carried out. On this basis, a VAT reform proposal is formulated, focusing on zero-rate benefits and exemptions. The impact and fiscal cost is quantified, as well as ways to compensate for this fiscal cost.

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Keywords: circular economy; repair and maintenance; VAT; tax benefits; tax expenditure; Mexico

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Resumen

Se destaca la importancia de las actividades de reparación y mantenimiento (RyM) que contribuyen a prolongar la vida útil de los bienes como una componente clave en transición a una economía circular (EC) y sostenible. Se analiza empíricamente el impacto del Impuesto al Valor Agregado (IVA) en las actividades de RyM y se realiza un análisis crítico de su tratamiento fiscal en la Ley del IVA (LIVA) y el régimen de beneficios fiscales existentes en la misma. Sobre esa base se formula una propuesta de reforma del IVA centrada en beneficios tasa 0 y exenciones. Se cuantifica el impacto y su coste fiscal, así como vías para compensar ese coste fiscal.

Código JEL: E62, H22, H23, H24, H25

Palabras clave: economía circular; reparación y mantenimiento; IVA; beneficios fiscales; coste fiscal; México

Introduction

Inspired by the work of Pigou, conventional environmental fiscal policy has focused on creating taxes that penalize specific polluting activities, with the intention of internalizing, through monetary values, the cost of negative externalities on the part of the polluting agents. The experience of the last decades shows the limitations of this approach and emphasizes the need for deeper reforms of the current tax system. Tax reforms are needed not only to penalize certain products or activities but also to make positive structural discrimination in favor of those activities that contribute to preventing and avoiding the causes that give rise to negative environmental impacts.

The architecture of the current tax system (in Mexico and the vast majority of countries) has as its backbone three major taxes that revolve largely around the use of the labor component, the income generated by labor and the added value generated by labor activity (69% of the total tax collection capacity) (López and Vence, 2021a). As a result, the tax system has a relatively higher incidence of labor-intensive activities (such as repair services). Both Income Tax (ISR) (Spanish: Impuesto Sobre la Renta) and Value Added Tax (VAT) are levied on this type of activity and cause a significant increase in their cost, higher than that borne by the automated industry, which manufactures new products and, in general, does not pay taxes on the consumption of new raw materials.

It is based on the idea that the current tax system is functional and consistent with the paradigm of the linear capitalist economy, and it is considered necessary to effectively influence costs and prices, positively and negatively, to reorient consumption and production decisions in an environmentally responsible direction that benefits society and the economy. Although a radical change of the current tax system will require a long timeframe due to its complexity and the powerful barriers it faces, there is an

unexplored margin to introduce feasible and viable tax reforms in the short term, which will move in the direction of favoring a transition toward the Circular Economy (CE) and sustainability.

To this end, the first steps should focus on an ambitious reform, using tax expenditure measures such as tax benefits, exemptions, and deductions applicable to existing major taxes (VAT, ISR). These instruments have become more widespread in general fiscal policy and also in environmental policy (Ashiabor, 2020) and can be used to drive the transition to CE, as indeed is done in the work of Grootuis et al. (2014; 2016) or Vence and Lopez (2021). In particular, this article analyzes the current VAT regime for repair and maintenance (R&M) services in Mexico and outlines a possible VAT reform introducing tax benefits for these activities. To this end, the article is structured as follows. Section two describes the different views of CE and the importance of R&M services that contribute to extending the life of assets. The third section empirically analyzes the impact of VAT on R&M services. In the fourth section, a critical analysis is made of its tax treatment in the VAT Law (LIVA) (Spanish: Ley del Impuesto al Valor Agregado) and the existing system of tax benefits, a reform proposal is formulated focusing on zero rates and exemptions, and its impact and fiscal cost are quantified. The fifth section summarizes the conclusions and final recommendations.

Circular economy and repair services

Repair, reuse, and maintenance have accompanied humankind since ancient times and are still very important today, despite the hyper-consumerist pressure and accelerated product obsolescence characteristic of the linear capitalist economy. Its role is revalued within the framework of the emerging paradigm of CE.

The concept of CE was born as a counterpoint to that of the linear economy, characteristic of a high resource- and energy-intensive industrial model based on an “extract-produce-use-throw away” sequence, which ultimately ends up being unsustainable for the biosphere and society. CE is a new production paradigm that emphasizes the regenerative capacity of the ecosystem, the minimization of the consumption of non-renewable resources, the extension of the useful life of goods, and the reuse of all materials that enter the economic cycle, eliminating waste and emissions as far as possible (Ellen MacArthur Foundation, 2012; Stahel, 2013; Geissdoerfer et al., 2017; Korhonen, 2017; Reike et al., 2018; Vence & Pereira, 2019; Blomsma, 2020). In any case, it is necessary to recognize that the concept of CE is under construction and precisely for this reason, there is no consensus on its principles and scope, resulting in many theories (Kirchherr et al., 2017).

One way to sort the great diversity of CE concepts is to distinguish between two major groups (Stahel, 2019; Blomsma, 2020). On the one hand, some emphasize the long cycles of materials and

molecules, focused on optimizing their use and their full recovery and continued reincorporation into the production cycle (McDonough & Braungart, 2002); in its most elementary version, it focuses on recycling as a central strategy. The second type of CE model emphasizes short product cycles, prolonging the use for as long as possible of the entire stock of goods produced (Stahel, 2019; Blomsma, 2020); this would be the “Age of R” (Reuse, Repair, Remanufacture). In this approach, “the Circular Industrial Economy (CIE) manages the stock of manufactured assets, such as infrastructure, buildings, vehicles, equipment, and consumer goods, to maintain their maximum value and utility, for as long as possible; as for resources, the CIE maintains the stock of these at their maximum level of purity and value” (Stahel, 2019, 12). Therefore, this shift toward a CE focused on stock management is based on three cycles of different natures. The first two constitute the “Age of R”: a) the cycle of reuse and resale of goods; b) the cycle of product life extension activities of goods. The third is the recycling cycle of molecules (secondary resources), which is part of the “Age of ‘D’.” The first cycles, centered on the reuse, repair, and remanufacturing of products, occupy a preferential hierarchical position from a circular and ecological point of view, as opposed to the waste management typical of the linear economy (despite everything, many governments seem to confuse recycling with CE); repair, reuse, and remanufacturing are preventive activities since, by prolonging the life of products, they reduce the need for new material resources and avoid the generation of waste. In summary, the operating criteria would be: “do not repair what is not broken,” “do not remanufacture what can be repaired,” and “do not recycle what can be remanufactured.”

Reuse and repair services play an important role in terms of sustainable consumption and also have other positive effects on society and employment. They cover not only the most standard consumer goods (clothing, footwear, furniture, etcetera) but also technological products (automobiles, household appliances, electronic products, computers, cell phones, etcetera) and all types of machinery and capital goods. Housing repair and rehabilitation could also be included in this same package. From a social point of view, they are high employment-generating activities, and from an environmental point of view, they are like islands of circularity that coexist and develop in the interstices of the linear model. In any case, the key aspect is that, by prolonging the life and functionality of goods, they are environmentally friendly as they avoid (and reduce) material waste and residues and, at the same time, reduce the extraction of raw materials and inputs (including energy) that would be used in the manufacture of new articles or consumer goods.

Currently, their potential is limited by the overwhelming weight of the dominant market creation logic of new product manufacturing companies and aggressive planned obsolescence strategies. Different studies (Deloitte, 2016; Dalhammar & Milios, 2016; Thungren & Zargari-Zenouz, 2017; EC, 2019) highlight barriers related to cost and susceptibility to repair, i.e., repairability which, in turn, is highly conditioned by design and planned obsolescence.

From a sustainability and CE perspective, these activities are set to increase their role in the economy and employment significantly. This alternative requires that reuse, repair, and remanufacturing services for the most diverse goods and equipment function properly, with fluid, abundant markets, well supplied with spare parts and components, with clear rules, offering quality and securities to users, and advantageous prices concerning the purchase of new goods.

There are several factors, both on the supply and demand sides, but a very important one is taxation because of its direct impact on relative prices and, therefore, on the behavior of producers and consumers. Some countries are trying to increase legal guarantees of products, and even countries such as France or Sweden are adopting measures to combat obsolescence and lack of spare parts. These and other European countries (Austria, Ireland, Luxembourg, Malta, Netherlands, Poland, Slovenia, Finland, United Kingdom, Belgium, and Spain) have adopted tax measures, although of limited and very uneven scope (CE, 2019).

Adverse nature of VAT for repair and labor-intensive circular activities: An empirical analysis

The empirical analysis of the VAT borne by the different economic sectors reveals the extent to which it is relatively more burdensome in some sectors than in others, depending on different factors, particularly their labor intensity.

Based on the 2019 Economic Censuses of INEGI (Spanish: Instituto Nacional de Estadística y Geografía), it is possible to identify the relation between the structural characteristics of the sectors and the VAT paid and collected by each one of them (Table 1). In particular, information is provided on the creditable VAT paid (“VAT_{cp},” which corresponds to the VAT paid by the companies of a sector to their suppliers in the act of purchasing inputs and services) and the VAT charged (VAT_{tc}, which corresponds to the VAT charged by the companies of the corresponding sector to their clients in the act of selling goods and services).

Assuming that their incidence was homogeneous and neutral, it could be assumed that the proportion represented by the VAT_{tc} of each sector in the total income (turnover) of the sector should be more or less the same and close to the normal VAT rate (16%). Nevertheless, when calculating this ratio, it can be seen that there is an enormous disparity between one sector and another: from 4.5% in the manufacturing sector or 5.3% in the primary sector to 15.6% in recycling and remediation services. In the R&M sector, it reached 13.57%.

The descriptive statistical analysis of the VAT_{tc} data provided by INEGI and the regressions of the ratios that reflect the structural characteristics of the sectors (Figure 1) confirm, first, that the relative

weight of VAT is very dissimilar in the different sectors and second, that this disparity is related to the characteristics of the production sectors. Specifically, it is observed that service activities, which are the most labor-intensive (measured by wages over purchases or wages over income), tend to bear a higher VATtc with the value of their sales than the VATtc borne by activities that are more intensive in capital or material inputs, such as those of the primary sector, mining, industrial manufacturing, construction, or wholesale trade. In particular, it can be seen that R&M activities, as well as recycling and remediation, charge a much higher VAT than the mean for the economy and most production sectors. This fact leads to the inference that the VAT tends to penalize the labor-intensive nature of this sector and that the specific design of the VAT regime in Mexico provides many exceptions and benefits that affect the different sectors very unequally.

Table 1
 Sectoral characteristics and VAT paid and collected. Mexico 2018. (In thousands of pesos)

Sector	Description	Remuneration/Income (%)	VATtc/Income (%)	VAT accrued - paid	VAT transferred charged	Intermediate Demand %	Final demand %	Estimated VATtc final demand	Estimated VATtc Intermediate demand
11	Agriculture, animal husbandry and farming, forestry, fishing and hunting	12.68	5.34	2 312	2 378	57	43	1 022	1 355
21	Mining	5.69	6.60	18 081	80 920	50	50	40 460	40 460
22	Gen., transm., distrib., and commerc. of electricity, water, and natural gas	2.96	13.92	96 908	118 921	80	20	23 784	95 137
23	Construction	7.53	11.20	48 778	59 649	9	91	54 281	5 368
31-33	Manufacturing industries	6.69	4.50	831 141	493 307	40	60	295 984	197 323
43	Wholesale trade	2.35	5.72	43 134	309 686	60	40	123 875	185 812
46	Retail trade	3.04	9..86	534 601	548 795	11	89	488 427	60 367

48-49	Transportation, mail, and warehousing	14.46	9.33	54 644	74 218	21	79	58 632	15 586
51	Information in mass media	11.44	15.21	68 372	94 376	40	60	56 626	37 750
52	Financial services			182 011	259 515	29	71	184 2560	75 259
53	Real Estate Serv. and rental of movable and intangible assets	6.93	15.28	14 522	31 595	18	82	25 908	5 687
54	Prof., scientific and technical services	20.95	13.88	16 912	41 397	84	16	6 624	34 774
55	Corporate	14.00	13.01	15 220	59 720	100	0	0	59 720
56	Support for waste business and management, and remediation services	27.73	15.64	34 036	106 663	93	7	7 466	99 197
61	Educational services	36.76	15.31	9 980	30 832	1	99	30 524	308
62	Health and social assistance	18.23	15.17	15 565	28 075	1	99	27 794	281
71	Cultural, sporting, and recreational services	14.23	15.20	9 854	17 475	6	94	16 427	1 049
72	Catering and food and beverage preparation services	11.08	14.88	62 041	106 098	15	85	90 183	15 915
81	Other services except government activities	18.61	13.70	19 125	38 220	26	74	28 283	9 937
sub-811	Repair and maintenance services ^a	14.60	13.57	12 163	25 063	26	74		
	TOTAL	7.76	7.69	2 477 238	2 501 841			1 560 555	941 285

Notes: a. The values of subsector 811 are part of the overall composition of sector 81. Source: Economic censuses 2019 (INEGI, 2020a; INEGI, 2020b) and input-output matrix (INEGI, 2020c)

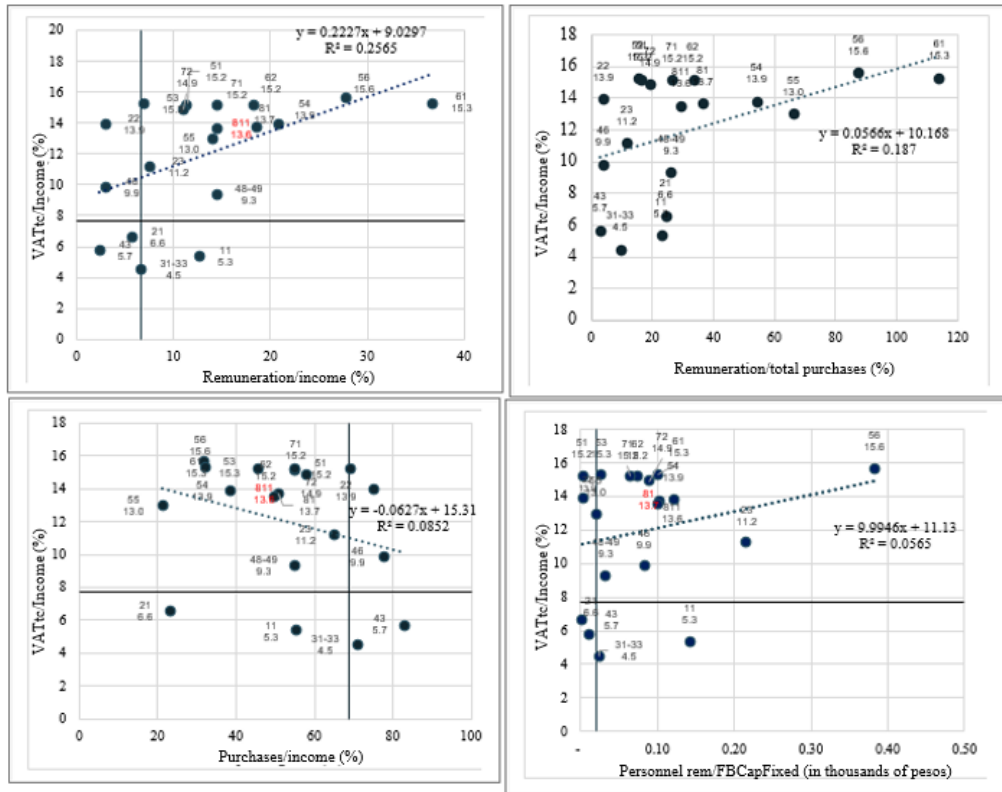


Figure 1. VATtc regressions on structural ratios for productive sectors

Note: for the nomenclature of branch codes, see Table 1

Source: created by the authors based on Economic Censuses 2019 (INEGI, 2020a; 2020b)

Data from INEGI’s 2019 Economic Censuses provide evidence of these characteristics of Mexican R&M services and also their importance in the country’s economy (see Figure 2): 7.83% of the total number of companies or economic units in the country; 3.21% of total national employment (2.24% in the case of permanent workers and short-time workers, and 7.31% in the case of unpaid personnel); 0.68% of total national turnover (obviously, informality is left out and this sector likely presents a significant degree of undervaluation of real income); and only 0.49% of “expenditures for consumption of goods and services” of the national total.

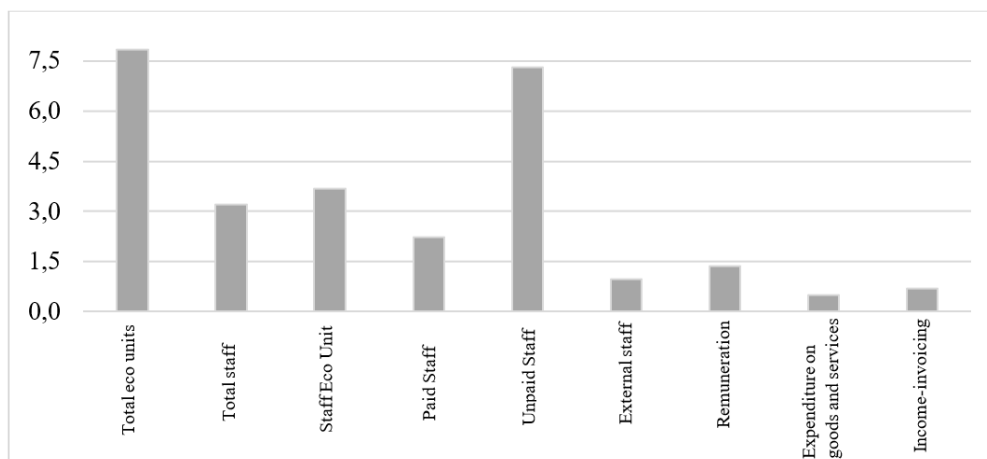


Figure 2. Repair and maintenance services as a proportion of the national economy (In percentages). Mexico 2018

Source: created by the authors based on INEGI, Censos Económicos 2019 (INEGI, 2020b)

These data are consistent with the characterization of these activities in other studies (López-Bermúdez & Vence, 2020; Llorente-González & Vence, 2020). In short, this labor-intensive nature and the very low spending on inputs, materials, and machinery reveal that these are highly circular activities, with reduced pressure on the extraction and consumption of natural resources and, therefore, clearly sustainable. They also present other relevant characteristics such as the predominance of very small companies and self-employed, some highly qualified, with very dispersed locations in the national territory.

This reality justifies the relevance of reviewing the tax treatment of this sector and eventually introducing a tax reform; in particular, the possibility of reviewing the design of taxes such as VAT and introducing a different design from the current one should be considered. These are activities with a sustainable and circular profile, which contribute directly to the extension of the useful life of goods and, therefore, to the reduction of pressure on the extraction of natural resources and pollution. For all these reasons, it seems reasonable to examine the possible ways to introduce changes in the VAT regulation as it affects this type of service activity.

Assessment and applied study of the VAT regime for repair services in Mexico: Proposal for its reform

Review of the VAT frame of reference: Technical and tax treatment of repair and maintenance services

VAT is an indirect tax whose taxable charge is borne by the final consumer. It is a tax that operates on a chain that is assumed to have a linear flow and that ends with the use or consumption of the good or service by the consumer or user, at which point there is no creation of value but rather “destruction of value.”

In order to specify the role of VAT in repair services, the regulation that establishes it (LIVA) is briefly described. First, considering R&M as services, Article 14 is analyzed. This provision defines what is to be understood as a rendering of services; however, R&M services are not indicated as such but are included according to the interpretation of Section V.’ technical assistance.’ In fact, for the Tax Administration Service (SAT) (Spanish: Servicio de Administración Tributaria), technical assistance services are economic activities dedicated to repair or maintenance. Likewise, it is understood that these are activities subject to the 16% rate (as indicated in Article 1 and reiterated in Article 14) since they are not described in any of the precepts where the 0% rate, exempt, or non-taxable activities are listed.

According to the article mentioned above (art. 14), it is established that VAT will be levied on the sales prices of services and the provision of services carried out individually (independently). Since VAT is levied on the final price, which incorporates all cost components, the proportion of VAT extracted from the labor factor depends on the relative weight of the labor cost (wages and other social contributions) in the final price. To the extent that in R&M services the wage component represents the largest part of the cost (29.3%), being very labor-intensive activities with little consumption of other inputs, it is concluded that VAT is applied on a value composed mainly of wages and other labor expenses, thus doubling its burden on the labor input.

Regarding the tax regime, R&M services can operate fiscally as private services (as individuals and self-employed, either according to the taxation regime for individuals with business and professional activities or as CFR) and as legal entities (with legal personality) (CFE, 2020; LISR, 2020; LIVA, 2020). Due to the predominant characteristics of these types of activities, especially the repair of household appliances, electronic items and the repair of household and personal use items, clothing, footwear, and even part of the repair of automobiles, these types of activities are usually carried out directly by individuals, without the need to have a salaried workforce. There are also other conditions in which this

type of service can be offered as a complementary service associated with other main services (e.g., the R&M services offered by large groups dedicated to the supply of ‘heavy’ industrial and agricultural machinery and equipment or the services that car companies offer to their clients—optionally, and sometimes as a guaranteed condition—through their agencies and dealerships).

The LIVA establishes a general tax rate of 16% and sets out exceptions to the 0% rate rule and exemptions from the non-payment of the tax for certain economic activities. These exceptions to the rule introduce many benefits, which together account for about 38% of the collection of this tax and 9.5% of total tax revenues in 2018. None of these benefits accrue to R&M services. Nevertheless, among these benefits, some activities have clear environmental consequences and cause damage to natural resources (see Table 3).

The benefits include, above all, those related to the agricultural sector—in Mexico, an essential part of the primary sector—due to their large amounts. Indeed, the LIVA is subject to a 0% tax rate on the values for domestic and export sales of primary sector products and many consumer goods and services related to these economic activities. By applying rate 0, these activities may claim a refund of those VAT amounts that are transferred to them (and have been effectively paid) for the acquisition or purchase of goods and services essential for the operation of the business (see articles 22 of the Federal Tax Code-CFF; articles 5 and 6 of the VAT Law). The portfolio of benefits for this sector is very broad, both through this regulation and through other regulations that are part of Mexican tax legislation (e.g., LISR [Spanish: Ley del Impuesto Sobre la Renta]; Miscellaneous Tax Law; Administrative Facilities Resolution; and LIF [Spanish: Ley de Ingresos de la Federación], among others).

From an environmental perspective, it is necessary to point out that many of the elements and inputs used for the production of the primary sector (national or for export)—which receive such favorable treatment—cause great damage to natural resources and problems of air, groundwater, and soil pollution, etcetera, whether by the inputs used for working the land (fertilizers, pesticides, herbicides, fungicides, drilling of wells, etcetera), or by the specialized treatment for aquaculture and fishing activities (in freshwater and sea species). The same applies to machinery and equipment used in the agricultural sector.

The justification for this favorable tax treatment derives from the social function of food production, which is an essential good for the entire population, including those with more modest incomes. Nonetheless, it would be debatable in the case of agro-industrial production for export, which is viewed as another sector of the national economy and is of great importance in Mexico.

On the other hand, sustainable production or consumption, for example, the sale value of “waste to be used as an input for industrial activity or commercialization” (recycling) and R&M services (extension of the life of goods), are taxed at 16% VAT. As a positive assessment, it is noted that the sale of used goods (reuse) is exempt from tax payment (Article 9, Section IV). Nevertheless, such benefit

excludes the sale of used goods when made by a company; such exclusion causes certain controversies in the text of the LIVA but excluding them from the benefit is also a criterion that contrasts with sustainable consumption.

Consequently, it can be concluded that R&M services are subject to the 16% rate and generally do not benefit from any type of exemption or reduced tax rate.

A striking example that reveals the neglect of the LIVA regarding R&M services is what happens with agricultural machinery and equipment. In this case, the purchase of agricultural machinery and equipment benefits from an incentive by applying the 0% rate and, on the other hand, the R&M of these is subject to the 16% rate. Furthermore, something similar occurs in the import of vehicles. The bias in favor of purchasing new goods and against repairing and extending their useful life is quite evident. If the first operation does not charge VAT and the second one does, it is clear that this is an additional factor that favors buying the new good and sending the used one to scrap. This fact places the repair, maintenance, or remanufacturing sector at a clear competitive disadvantage, as it will have to make up for this differential to be competitive with new manufacturing.

From the perspective of the CE, it is clear that VAT-type indirect taxation responds to linear chain principles contradictory to the former. It could be said that this is so because the tax is charged on the value added to the product and not, obviously, on the value destroyed. For example, it is paid when a good or service is purchased. It is also paid when it is repaired, remanufactured, or sold second-hand, and also when it is recycled (see Figure 3). Corbacho, Fretes, and Lora (2013, p.261) state that this unidirectional nature of VAT is complicated when the chain flow is reversed, as in the sale of used or second-hand goods, for example.

On the other hand, there is no tax if this product is discarded, either converted into waste or destroyed, when in fact this destruction constitutes a waste of accumulated resources and energy. This problem is not exclusively private but has a harmful social and environmental dimension. Certainly, it could be said that, from both a social and environmental point of view, this act of destroying the value of assets should have some kind of tax penalty.

Indeed, recycling is liable to VAT, so if the good delivered is paid for at a residual value (e.g., vehicles or machines for dismantling or scrapping), VAT must be charged for that value, certainly when the seller is a company. Subsequently, suppose the good is 'reincorporated' into the production chain to recover parts or materials. In that case, it will also be liable to VAT for the transaction between the waste manager and the reuser or recycler (and this would occur regardless of whether the consumer received any payment for the good, delivered or not) and, subsequently, between the recycler and the purchaser of these materials as raw material. In this way, the VAT paid on these transactions accumulates in the price of the resource recovered and reused (which is not the case when a new resource is extracted from nature).

It can be concluded then that VAT, by having a transferable characteristic in every purchase and sale transaction—even in the case of waste reduction, recycling, and reuse, or the efficient use of natural resources- penalizes (taxes) sustainable production and consumption. It also makes recycled materials more expensive when they are used as raw materials, and by charging VAT on the cost of all repair, maintenance, and remanufacturing service operations aimed at prolonging the useful life of goods as much as possible, it also penalizes the responsible and frugal consumer. This fact is a brake on closing the cycle and keeping resources already in use within the economy, which is precisely one of the objectives of CE.

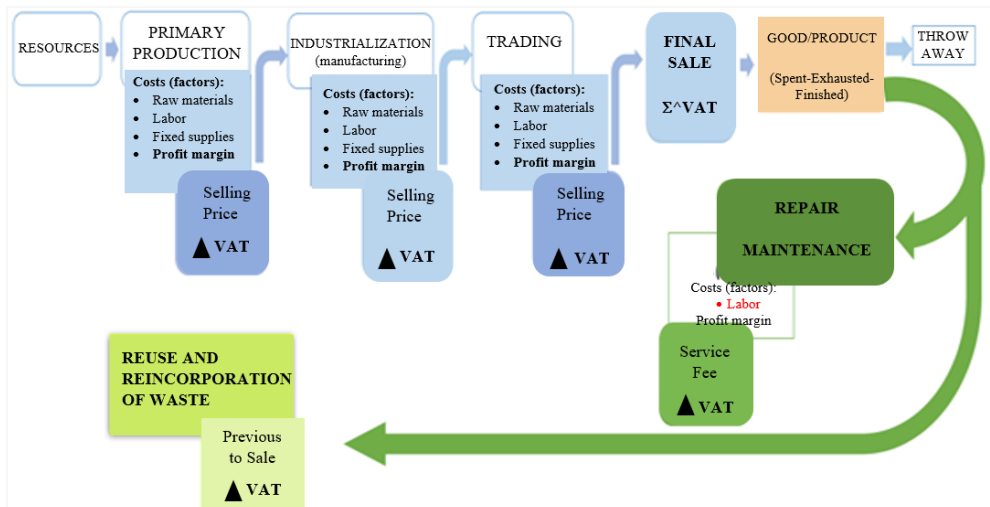


Figure 3. VAT pass-through and bi-incidence in sustainable “circular” activities: Circular chain flow
 Source: created by the authors

On the other hand, the 16% VAT penalizes this economic sector since, being highly labor-intensive activities, they must assume the costs of labor taxes, social contributions, and payroll taxes and then bear VAT on an added value that largely taxes the same items. The same redundancy occurs in the case of independent service providers who quote ISR and VAT for largely analogous values.

Given this reality, it can be concluded that VAT is more heavily taxed on activities that correspond to circular business models, for example, repair and maintenance of goods, equipment, and machinery, as well as activities aimed at waste reduction and remediation. The question is whether this should continue to be the case and whether it is possible to introduce changes to correct this situation.

What changes should be introduced and how? In order to boost demand for these activities, change can be implemented immediately and justifiably through tax benefits that enable tax reduction for

these circular businesses: repair and maintenance of equipment, repair of goods in general, reuse (e.g., second-hand markets), and waste reuse and reincorporation of waste into production processes.

The commitment to use tax expenditures, and the benefits, to boost repair has already been implemented in different countries. The European Union offers interesting evidence on the importance of promoting circular activities and the importance of using fiscal instruments for this purpose. The study on the repair sector conducted for the European Commission (EC, 2019) highlights its role in the European economy and its importance in reducing resource consumption and waste generation. Among the measures it proposes to promote these activities are tax instruments, particularly VAT. Several EU Member States have implemented specific changes to reduce VAT or apply income tax reductions to incentivize donations and encourage consumers to repair their goods. Sweden's most advanced example of this kind was launched in 2017 (RREUSE, 2017; EC, 2019). Two main tax measures were introduced: the first consists of applying a tax refund of up to 50% of the labor costs spent on repairing the appliances, and the second one consists of reducing the VAT for repair services. A scheme similar to the first one was also implemented in Austria. Other countries such as Ireland, Luxembourg, Malta, the Netherlands, Poland, Slovenia, and Finland opted for the second scheme and offered a VAT reduction on minor repair services (including repair and modification) of bicycles, shoes, and leather goods. France, Spain, Belgium, and the United Kingdom have measures to support certain repair or recovery services when performed within the social economy framework.

Proposal: A change in VAT to boost the transition to a circular economy in Mexico

In line with the proposals formulated by Ex'Tax Project (Groothuis et al., 2014; 2016) and Vence and Lopez (2021) and those implemented in some European countries (RREUSE, 2017; CE, 2019), the changes formulated here are focused on the establishment of tax benefits in the VAT applied to R&M and on the VAT rates applied to these activities.

Two options are analyzed: a) option A, establishing a reduced rate of 0% for all R&M services to promote their demand and benefit the activity; b) option B, consisting of applying an exemption regime for these activities.

In addition, it is considered necessary to eliminate tax incentives and benefits (tax expenditure) on consumption and activities that damage the environment (anti-environmental) and to eliminate subsidies and grants to sectors that do not promote environmental activities. It is also considered necessary to increase taxes on harmful consumption of natural and energy resources.

All these changes are considered relevant to meet the objectives of the environmental policy, and their implementation is relatively simple and quick as long as there is willingness on the part of the governmental authority.

The following is a step-by-step description of each proposed option, including the justification of the applicable incentives and benefits, the applicable rates, the quantification of their direct impact, the fiscal cost to the public Treasury, and finally, possible ways to compensate and neutralize this fiscal cost.

VAT incentives and tax benefits to promote CE businesses

a) Tax relief from the 16% rate to a zero rate for repair and maintenance services. This reform would be the greatest benefit for the sector in this tax, both for consumers and for service providers. Since they are constituted as 0% VAT taxable activities, they will have a double benefit: on the one hand, the sales phase with the final consumer will be 0%, which directly benefits the consumers, and on the other hand, the VAT effectively paid for the acquisition of raw materials, energy, and all types of inputs necessary to operate the business may be determined as a creditable tax (in its entirety) recoverable through a refund from the Treasury. That is to say, the company or service provider may have, as a result, a VAT value in their favor, which may be refunded through a refund procedure (according to the rules of the VAT Law [articles 5 and 6] and the provisions of art. 22 of the CFF [Spanish: Código Fiscal de la Federación], and other provisions of the SAT).

Considering the data provided by INEGI on VAT in the R&M sector for 2018, it can be estimated that this measure would result in savings for consumers in this sector of 25 063.1 million pesos, and the companies in the sector would stop paying an amount of 12 162.7 million pesos for the VAT transferred to them by their suppliers in their purchases.

This double benefit, the direct benefit for the consumer and the benefit for the company or service provider, would translate into a general and important improvement in the costs with which this activity would operate and a significant reduction in prices for the end consumer, surely higher than the 16% that the elimination of VAT would directly bring. It is to be expected that this will result from the effective cost reduction that the sector would also experience as a consequence of the refunds of the creditable VAT paid; these refunds could partially translate into an improvement in remunerations and margins but also into an additional lowering of the final prices of the service. The overall result of all this should be an improvement in the general conditions of these activities, improving their competitiveness compared to the sale of new products and favoring a significant increase in the demand for these services

and, therefore, greater reliance on the repair of goods, prolonging their useful life, with the consequent reduction in the consumption of new goods, natural resources, and energy.

b) VAT exemption on repair and maintenance services. In this case, the companies providing the service would not apply VAT on the services rendered to their clients. Nevertheless, the benefits of this model are limited to the extent that the company or service provider cannot recover the balance of the VAT paid on the purchase of materials and other inputs through a refund. This impossibility of claiming the refund derives from the fact that the exemption regulation interrupts the birth of the tax obligation. Since there is no obligation to pay, the LIVA, through paragraph b) section V of article 5, states that the VAT that would have been transferred to them, not being obligated to pay, does not meet the requirements to be considered as creditable VAT. Nonetheless, the company will be able to incorporate it as spending in its accounts (so that it will be able to reduce the income tax base by a certain amount).

In this case, according to the VAT data provided by INEGI for the R&M sector in 2018, it is inferred that this measure would result in savings for consumers in this sector of 25 063.1 million pesos. In this case, there would also be a meaningful increase in the demand for these services, resulting in environmental and social improvements.

A comparison of the two options leads to the conclusion that the zero rate provides greater benefits for repair services. These benefits include eliminating VAT for consumers and enabling companies to recover the tax charged by their suppliers through a refund. Therefore, this would be the advisable option if a strategy to promote R&M is chosen because of its beneficial effects from an environmental and social point of view.

Nevertheless, as discussed in the following section, these two options will have secondary effects on tax collection.

Estimated fiscal cost of different reform options

Option A represents a higher cost to the Public Treasury. In the event of a change from a 16% rate to a zero rate, the aggregate revenue from consumption generated through these activities will decrease, and the potential tax collected as a result of refunds will also be reduced. Conversely, option B, given the tax rule, will only have the effect of interrupting collection during the exempt phase, which exclusively benefits consumers.

Estimating the fiscal cost of the two options considered is far from straightforward. No direct data, either from INEGI or the Treasury, provide unequivocal information on the fiscal cost of these activities. On the one hand, the Public Treasury does not have information on VAT collection sector by sector; on the other hand, the information from INEGI's Economic Censuses includes the sum of the

values of VAT transferred or transferable accounted for by the companies in the sector themselves, but these figures do not reflect what is collected by the Public Treasury. This is so for several reasons: first because in the quantification of this tax, the values of VAT collected and paid by each of the companies to their suppliers in the different sectors of the economy and their sector are compared so that the corresponding balances cannot be calculated at the sectoral level. A precise estimate would require information for the value chains of each activity or according to a disaggregated Input-Output Table (“I-O Table”), which is also unavailable. Second, because in the determination of the tax liability, there is a highly variable casuistry both for the calculation and the liquidation of the tax, depending on the type of activity; third, due to the intervention of other tax relief techniques; fourth, due to the singularities of certain sectors; fifth, because the effects of the final balance collected in one year may be a consequence of others, of the inevitable economic cycles, etcetera. Sixth, other phenomena, such as evasion and fraud, can result in significant differences between the VAT reflected in the companies’ accounts and the actual revenue collected by the Public Treasury.

Taking the data for the R&M sector (Table 1), proceeding with this corrected estimate is necessary. Indeed, since this is a service sector whose sales are mostly oriented to final demand (74%, according to INEGI’s I-O Table), it could be assumed that the VAT charged to its clients and the creditable VAT paid is quite close to the VAT borne by the sector and collected by the PT. Nevertheless, that assumption would lead to the conclusion that the VAT borne by R&M services (37 225.8 MXN, adding VAT paid and VAT collected) would represent 4.0% of the total VAT collected by TP in the same year, 2018 (922 238 MXN). This is an extremely high figure when compared to the economic weight of these activities in the national economy: 0.63% of national revenues and 0.49% of national expenditures. This disproportion could suggest a) that this sector is subject to disproportionately higher VAT than other sectors as a consequence of its structural characteristics since it is very labor-intensive (3.2% of total personnel, 2.24% of paid personnel, and 1.29% of total remunerations); b) that there is a considerable disparity between the VAT figures provided by INEGI based on business accounting and the actual collection by the Public Treasury.

In light of what has been previously discussed, the former would be consistent with the hypothesis that the current VAT regime penalizes this sector more intensively due to its structural characteristics. The latter would suggest the advisability of correcting the figures obtained from the INEGI database, under the assumption that these would tend to be much higher than those of the actual tax collection and, consequently, it could be assumed that the real fiscal cost for the Public Treasury would be lower than the one calculated via INEGI.

Consequently, the only way to approach this quantification of the fiscal cost of the proposed measures is through an approximate estimate based on a series of reasonable assumptions combining

INEGI data on VAT paid and transferable by sector and national tax collection data from the Public Treasury, first estimating a proportion at the aggregate level and then extrapolating it to the sectors.

Considering these difficulties and precautions, an approximate estimate of each option's fiscal cost is made based on the data available from the input-output matrix of the national accounts and the VAT data from the INEGI economic census (Tables 1 and 2).

The methodologically complex question is how to approach this correction based on what criteria. One hypothesis could be to try to estimate the VAT of productions destined to final demand from the value of the transferred VAT collected (applying the same percentage that Final Demand represents over the total production destination of each sector according to the Input-Output Table) and then contrast this value with the VAT collected. The relation between both magnitudes would give the efficiency of the tax administration to transform the "tax quota" into an effective collection. In order to calculate the VAT tc corresponding to sales to intermediate demand and final demand sector by sector, the percentages obtained from the latest INEGI Input-Output Table available for the Mexican economy are applied (INEGI, 2020c).

This calculation shows that the VAT corresponding to the total intermediate demand of the economy would be 941 285 MXN (approximately 37.6% of the VATtc) and that corresponding to the total final demand would be 1 560 555 MXN (approximately 62.4% of the VATtc) (Tables 1 and 2). In the absence of deviations, exceptional situations, evasions, fraud, margins of error in the percentages of the I-O Table coefficients and the calculations, etcetera, this would be the value equivalent to the VAT balances of the economy as a whole: 1 560 555 MXN. With all these conditions, this figure should correspond to the VAT collected by the HP, although the actual figure offered by the HP is considerably lower (922 238 MXN), only 59.1% of the VATtc. This deviation between actual and "expected or potential" revenues is due to a combination of the factors indicated above, and these factors occur more or less homogeneously in the different sectors of the economy.

Therefore, under those assumptions, that 59.1% would be the same percentage that could be applied to the INEGI figures to estimate what was "really" collected by PT from the Repair and Maintenance sector (Table 2). Applying this percentage of 59.1% to INEGI's VATtc value (25 063.1 MXN) will result in a value of 14 811.48 MXN (b), which, according to the assumed hypothesis, would be PT's collection of VAT on R&M sales. Making a similar estimate for the creditable VAT paid (12 162.7 MXN) by the companies in this sector for the purchases made would have an estimated value for the PT of 7 187.7 MXN (a). With these two estimates, it would then be possible to proceed to estimate the fiscal cost of the two options proposed for the R&M sector:

- a) in the case of the rate 0 option, the fiscal cost would be 21 999.2 MXN;
- b) regarding the exemption regime option, there would be a fiscal cost of 14 111.4 MXN.

Although the zero-rate benefit option A has a higher fiscal cost, it is undoubtedly the most advisable to give a decisive boost to repair, maintenance, and remanufacturing services that favor a change toward a circular and sustainable production and consumption model. These economic activities have always been circular and sustainable and do not harm the environment, whose essential input—labor—is renewable and penalized by the current tax system.

Table 2
 Estimated value of VAT revenue and Fiscal Cost of the reform (in Millions of pesos)

Description	Creditable VAT paid	VAT transferred charged	VAT tc Intermediate demand (37.56%)	VAT tc* Final demand (62.27%)	VAT collection (SHCP)
Domestic economy	2 477 238.0	2 501 840.0	941 285	1 560 555	922 237.1
Effective estimate of VAT collection by SHCP/VATtcDF					59.10% VATtc Final Demand
VAT Repair and maintenance services (INEGI)	12 162.7	25 063.1			
Estimated Effective VAT Collection R&M (59.1%)= Estimated fiscal cost	7 187.7 (a)	14 811.4 (b)	Option A (a+b): 21 999.20	Option B (b): 14 811.48	

Source: created by the authors based on INEGI and SHCP (Spanish: Secretaría de Hacienda y Crédito Público) (2020)

Notes: a) 59.10% represents the estimated collection percentage for the period evaluated, which is obtained from the division of the VAT collection values (SHCP data) and the VAT value of the final demand (INEGI data); b) the application of this percentage to the values of VAT paid and collected by the Repair and Maintenance sector provided by INEGI makes it possible to “estimate” the value of the effective collection of the creditable VAT (7 187.7) (a) and paid (14 811.4) (b); c) these two quantities make it possible to estimate the fiscal cost of the two reform options: Option A (21 999.20) (a+b) and Option B (14 811.48) (b).

Implementing any of the proposals above will imply a clear definition by the legislator of the concepts included in repair and maintenance services to avoid advantageous extensions of the same. This qualitative technique could be specified through the VAT Regulation as an instrument accompanying the

main VAT regulation (LIVA). It will legitimately distinguish what is understood as repair and maintenance services and the concepts that integrate the value of the base that will include the tax benefit (tax deducted at 0% rate or exempted from payment) in the reform, considering for this base the set of costs identified as labor, technique, components, inputs, and materials that were incorporated into the value of the service.

It is also advisable to integrate these measures into a broader framework together with other measures, including the prosecution of tax fraud and tax evasion and other measures to improve the tax collection capacity of the Public Treasury. Indeed, tax revenue in Mexico is very low compared to other OECD countries, so it seems advisable that tax benefit proposals such as those presented here be compensated with other measures to recover revenue to sustain the already modest fiscal capacity of the Mexican state (López and Vence, 2021a). To this end, the most coherent and feasible way would be to eliminate or reduce a large part of the currently existing benefits whose effects are harmful to the environment and are not justified by reasons of clear social interest (López & Vence, 2021b).

Feasible options to neutralize the fiscal cost of tax benefits for circular activities

As mentioned above, a doubly beneficial means of compensation would be eliminating existing benefits that are harmful to the environment since this could compensate for the reduction in revenue for the Public Treasury and, at the same time, would also have favorable environmental consequences.

For example, GHG emissions, particularly CO₂ generated by fossil fuels, ocean pollution, and resource depletion, among others, are currently one of the central issues in environmental climate policy. Nevertheless, the current tax system maintains benefits that favor CO₂ emissions, new equipment (vehicles) consumption, and chemical inputs that damage land resources and pollute aquifers, rivers and seas. Some apply to VAT, as discussed in section 4.1, and others to other taxes (ISR, STPS, ISAN [Spanish: Impuesto Sobre Automóviles Nuevos]).

A systematic review of tax expenditure based on CIAT (Inter-American Center of Tax Administrations, 2020) enables the estimation that the fiscal cost of environmentally harmful benefits was 296 659 million pesos in 2018 (see Table 3) (Lopez and Vence, 2021b). This amount would be 61 018 million if the existing benefits for the agri-food sector are excluded (235 641 MXN). As indicated, this sector would require a nuanced study and discussion due to its singularity as it is subject to a social-food policy. Nonetheless, it is necessary to recognize that a significant part of the sector is classified as an export-oriented agro-industrial sector that benefits from the zero-rate tax exemption on harmful inputs such as fertilizers, pesticides, herbicides, fungicides, and other non-ecological inputs such as agro-industrial equipment and machinery and non-sustainable services.

Table 3

Tax benefits and incentives with negative environmental impact and collection potential in 2018

VAT	248 685
Food (agri-food sector)	235 641
Service or supply of potable water for domestic use	13 044
Corporate income tax	25 413
Motor Carriers - Diesel STPS Credit (tolls)	7 244
Credit to the mining sector	122
Gasoline and diesel tax incentives for fishing and agricultural sectors	3 186
Decrease in rent for purchase of automobiles	14 861
STPS	17 435
STPS credit for diesel fuel to the agricultural and forestry sector	5 119
Fossil fuels STPS credit	15
Motor Carriers - Diesel STPS Credit (machinery in general)	10 608
Motor Carriers - Diesel STPS credit (special marine)	1 693
ISAN	5 126
For a value of MXN 229 359 and up to MXN 290 521 (50% exemption)	1 314
Up to a value of MXN 229 359 (100% exemption)	3 812
Total	296 659

Source: created by the authors, based on CIATData (2020)

Conclusions

Taxation is a key instrument for the transition to CE because of its ability to alter market forces and prices so that it can influence not only consumption but also all stages of the chain, affecting innovation, design, and manufacturing patterns of goods.

The objective of CE and the new circular taxation would be not only to penalize pollution—or in the manner of standard environmental taxation—or to increase efficiency in the consumption of resources but also to promote activities, goods, and consumption that avoid the consumption of new non-renewable resources and the generation of waste by prolonging the life-span of goods. With strategies of eco-design, reduction, repair, maintenance, remanufacturing, and reuse of items used in consumption (and production), it is possible to contribute to staying within the planet's ecological limits.

A major shift will require changes in the very architecture of the current tax system, replacing the current large labor-focused taxes with a new type of circular resource-focused taxes (Stahel, 2013; Raworth, 2017; Groothuis, 2016; Beeks & Lambert, 2018; Vence & Lopez, 2021). Nevertheless, such a dramatic change requires time for its formulation and implementation and, above all, it requires broad consensus within the country and even agreements at the international level. Therefore, it is necessary to undertake feasible changes in the short term. Among them, it would be appropriate to begin by using tax benefits to promote those activities that already exist, which are circular, and yield the highest level of

environmental advantages. R&M are activities that extend the lifespan of goods, thus reducing the consumption of new resources and energy required for the manufacture, transportation, and marketing of new goods and also contributing to reducing the volume of waste generated. In addition, these activities generate employment and social and territorial cohesion.

The VAT rebate measures for R&M services create positive incentives for a change in consumer and producer behavior that can drive the transition to CE while combining environmental and social objectives. Lower prices would encourage demand for repair and reduced consumption of new products, reduce waste and pollution, stimulate local demand, and meet SDG12 of the 2030 Agenda for Sustainable Development.

Given the above arguments and the empirical results, it can be concluded that a tax reform of the VAT regime introducing a zero-rate tax benefit to favor circular and sustainable activities such as R&M is relatively easy to implement in the short term. The main step required is a reform of the VAT Law Regulations to define the range of activities that would be eligible for the proposed tax benefits and the items included in the base. Moreover, it does not require major legislative changes, it is administratively inexpensive, and the fiscal cost is affordable and, in any case, can be offset by measures that are equally easy to implement, such as the elimination of certain existing and controversial benefits that are harmful to the environment. The elimination of anti-environmental benefits may be a measure that reinforces ongoing environmental tax reforms and offsets the fiscal cost of the measures proposed here.

The management of tax benefits can be accompanied by strengthening environmental taxation by increasing rates in the current CO₂ and pesticide taxes and other environment-related taxes.

In order to move forward with this mix of instruments, it is necessary to assess not only their environmental and fiscal effects but also their social effects, with particular emphasis on their impact on inequalities and the poorest social sectors. Accordingly, the proposal formulated here to establish zero-rate benefits for R&M services (and eventually for recycling and remediation) is socially far superior to certain taxes such as the CO₂ tax. One of the criticisms of this tax is its impact on lower incomes due to the effect on the prices of essential inputs (fuel, vehicles, air conditioning, heating, etcetera). In contrast, tax credits for R&M activities have a significant ecological impact and a very beneficial social impact in multiple dimensions. On the one hand, repair services are used to a much greater extent by the more modest social sectors; on the other hand, it is a sector that creates much employment (with different types of qualifications), and, in addition, they are activities that tend to be widely distributed across the country, located close to consumers. They are, therefore, sustainable activities that favor inclusion and social and territorial cohesion.

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