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▶ Employment impact assessment of the Malawi M1 road rehabilitation project



▶ **Employment impact assessment of
the Malawi M1 road rehabilitation
project**

Authors: Luis Villanueva and Keren Neza

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ISBN: 9789220393659 (web PDF)

Photo credits: Front cover: Adobe Stock - 104776636

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► Acronyms and abbreviations

AfDB	African Development Bank
CGE	computable general equilibrium
COMESA	Common Market for Eastern and Southern Africa
COMTRADE	Commodity Trade Statistics Database
EFSD+	European Fund for Sustainable Development Plus
EIB	European Investment Bank
EU	European Union
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
GDP	gross domestic product
GFCF	Gross Fixed Capital Formation
GTAP	Global Trade Analysis Project
ICOR	Incremental Capital Output Ratio
ICT	Information and communication technology
IFPRI	International Food Policy Research Institute
IHS3	Integrated Household Survey
ILO	International Labour Office/Organization
IMF	International Monetary Fund
ISIC	International Standard Industrial Classification of All Economic Activities
KIA	Kamuzu International Airport
LCMS	Living Condition Monitoring Surveys
LES	Linear Expenditure System
LFS	Labour Force Survey
MGDSIII	Malawi Growth Development Strategy
MW	megawatt
MWK	Malawi Kwacha
NAM	National Accounting Matrix
NSC	North-South Corridor
PIDA	Programme for Infrastructure Development in Africa
RA	Roads Authority
SADC	Southern Africa Development Community
SAM	Social Accounting Matrix
SMSD	Structural Model for Sustainable Development
UNFPA	United Nations Population Fund

► Acknowledgements

This report was reviewed by Mito Tsukamoto, Chief Employment in Investments (EMPINVEST) Branch, International Labour Organization (ILO) and Ralf Krueger, Chief Technical Adviser (ILO). The authors would also like to thank David Kucera, Xiao Jiang and Alina Game for their valuable comments and suggestions on the earlier versions of this report. They also want to express their gratitude to Lucky Mfungwe and Joyanna Pelivani for their excellent contributions as research assistants for this assessment. The report has also benefited from comments from the participants at the International Input Output Association Conference which took place in June 2023 in Alghero, Italy. The missions to Lilongwe, Malawi and meetings with the EU delegation, the Roads Authority and other national stakeholders provided valuable insights for this report. Finally, the authors want to thank Audrey Goetz and Fidele Kouassi for their technical assistance in the final stages of producing this report.

Executive Summary

The ILO's [STRENGTHEN2](#) project¹ is conducting employment impact assessments of EU-funded investments in sub-Saharan Africa, with the goal of promoting the creation of more and better jobs. Through the European Fund for Sustainable Development Plus (EFSD+), the European Union (EU) is supporting Malawi's M1 Road Rehabilitation project. The project aims at improving access to trade and essential services, fostering regional integration, strengthening growth, and reducing the time and cost of transport along the Common Market for Eastern and Southern Africa (COMESA) North-South Corridor. More generally, the project intends to contribute to transforming Malawi into a middle-income country by 2063. The project consists of the rehabilitation, widening and marginal alignment of about 300 kilometres (km) of the M1 road in the following sections, Kacheche-Chiweta (66 km); Jenda-Mzimba (47 km); Kasungu-Jenda (86 km) and Kamuzu International Airport (KIA)-Kasungu (102 km). The project started in 2022 with a total budget of €191 million and an EU contribution of €134 million through the European Investment Bank (EIB).

An ex-ante employment impact assessment of the M1 road rehabilitation project has been conducted. Given the available information we obtain three kinds of employment impacts: direct, temporary and permanent. The direct employment effect is defined as the employment generated due to the implementation of the project as related to the total labour costs of the project (that is, workers hired by the construction companies). Temporary employment is defined as the employment generated due to the implementation of the project as related to the purchase of domestic intermediate goods used during the duration of the construction of the project. Thus, the direct and temporary effects capture the employment effects of rehabilitating only the four sections of the M1 road. Permanent employment is the employment generated by longer-lasting outcomes of the project (such as an improved transportation system and higher transportation capacity), which pushes the economy to a higher equilibrium with higher output and employment. The permanent effects capture the employment effects of the improved road network and applies to the whole road (once it has been upgraded); this includes jobs for the operation and maintenance of the road.

Direct employment effects were obtained from projections based on information provided by the construction companies across the rehabilitated sections of the M1 road. The ILO's Structural Model for Sustainable Development (SMSD) is used to calculate the temporary and permanent job impacts. This model is constructed based on the International Food Policy Research Institute (IFPRI) 2014 Malawi Social Accounting Matrix (SAM) which contains information on production, income generation, and distribution and use of products. Information from the SAM and other country-level statistics is used to calibrate the model. A key component of the model is the sector-level adjustment mechanism which reflects features of a low-income developing economy.

The ex-ante assessment results are provided in headcounts and indicate that 3,932 direct jobs can be created by the implementation of the M1 road project. Most of them will be for young male workers with varying skill levels across the different lots. Female workers in all lots demonstrate a negative discrepancy when compared to the average female employment rate in the construction sector. Considering that the construction sector already struggles with a low female employment rate, this negative bias is concerning and suggests that there is room for efforts towards promoting female employment.

A sizeable likely impact on temporary employment is found, resulting in the potential of 11,977 temporary jobs being created. Most of these jobs would be generated in the retail trade sector, followed by the human health and social work sector. The temporary jobs may tend to favour young and skilled workers, while no bias is found for female workers. The estimated temporary macroeconomic effect of the project includes real GDP and employment growth accompanied by inflation and an improvement in the government, private and trade balances (as shares of GDP). All rural farm households would experience a real income growth of about 2 per cent.

The completion of the project (once the road has been rehabilitated) brings the economy to a higher level of economic activities accompanied by higher output and employment. That is, the economy experiences a "capacity expansion" in the transportation sector, which causes spill over effects to spread across the rest of the economy. The capacity effect reduces the output constraint in the transport sector, which pushes the economy towards a higher equilibrium activity level with additional output and employment. The employment generated by the capacity effect is "permanent" in the sense that it is generated by the long-lasting outcomes of the project and not by the labour demanded during the implementation of the project. Using the well-established concept of Incremental Capital Output Ratio (ICOR), the permanent employment effect of the

¹ STRENGTHEN2: Employment Impact Assessment to Maximize job creation in Africa. More information at www.ilo.org/strengthen2.

M1 project amounts to 2,950 jobs (in headcounts), most of them generated in the transport sector followed by the retail trade sector.

The permanent jobs tend to favour female, young and skilled workers; however, the extent of this positive bias is bigger for skilled workers. The macroeconomic effect after the completion of the project includes real GDP growth and employment growth accompanied by an improvement in the real government and private balances and a slight worsening of the current account balance (as shares of GDP). Although households across all income groups and categories experience real income growth, non-farm rural households of the first and second quintiles experience the highest real income growth of about 0.7 per cent.

In sum, the M1 road rehabilitation project is estimated to provide a substantial positive employment impact. Although most of the jobs generated fall into the category of “temporary”, those workers could gain the necessary experience and skills from this project that can make them employable in projects with similar labour needs. Thus, they might contribute to skills building that can benefit the Malawian economy after the M1 road project is completed. The permanent employment effects might be encouraging since they show an increase for the long-term and are relatively formal. In addition, these jobs are also likely to address the female youth employment problems that are common in sub-Saharan African countries, since they tend to favour female and young workers. The negative gender bias in the direct jobs generated by the project is a source of concern as it is even stronger than for the typically male-dominated construction sector as a whole. The gender bias observed in direct employment could be addressed in the short run through gender-sensitive hiring practices. In addition, long-run policies such as workplace, education, and training policies can encourage more female workers to participate in the labour force and opt for jobs in this sector.

Résumé exécutif

L'un des objectifs principaux du projet de l'OIT STRENGTHEN2 est de réaliser des évaluations de l'impact sur l'emploi des investissements financés par l'Union Européenne (EU) en Afrique subsaharienne, afin de promouvoir la création d'emplois plus nombreux et de meilleure qualité. Par l'intermédiaire du Fonds européen pour le développement durable (EFSD+), l'Union européenne soutient notamment le projet de réhabilitation de la route M1 au Malawi. Ce projet vise à améliorer l'accès au commerce et aux services essentiels, à favoriser l'intégration régionale, à renforcer la croissance et à réduire le temps et le coût de transport le long du corridor nord-sud du Marché commun de l'Afrique orientale et australe (COMESA). De façon plus générale, le projet vise à aider le Malawi à devenir un pays à revenu intermédiaire d'ici 2063. Le projet consiste en la réhabilitation, l'élargissement et l'alignement marginal d'environ 300 kilomètres (km) de la route M1 dans les sections suivantes : Kacheche-Chiweta (66 km) ; Jenda-Mzimba (47 km) ; Kasungu-Jenda (86 km) et Kamuzu International Airport (KIA)-Kasungu (102 km). Le projet a commencé en 2022 avec un budget total de 191 millions d'euros et une contribution de l'UE de 134 millions d'euros par l'intermédiaire de la Banque Européenne d'Investissement (BEI).

Cette étude repose sur une évaluation ex-ante de l'impact sur l'emploi du projet de réhabilitation de la route M1. Compte tenu des informations disponibles, nous obtenons trois types d'impacts sur l'emploi : direct, temporaire et permanent. L'effet direct sur l'emploi est défini comme l'emploi généré par la mise en œuvre du projet par rapport au coût total de la main-d'œuvre du projet (c'est-à-dire les travailleurs embauchés par les entreprises de construction). L'emploi temporaire est défini comme l'emploi généré lors la mise en œuvre du projet par l'achat de biens intermédiaires nationaux utilisés pendant la durée du projet. Ainsi, les effets directs et temporaires reflètent les effets sur l'emploi de la réhabilitation des quatre tronçons de la route M1 uniquement. L'emploi permanent est l'emploi généré par les effets à plus long terme du projet (tels qu'un système de transport amélioré et une plus grande capacité de transport), qui pousse l'économie vers une conjoncture plus favorable avec une production plus élevée et des emplois plus nombreux. Les effets permanents saisissent les effets sur l'emploi de l'amélioration du réseau routier et s'appliquent à l'ensemble de la route (une fois qu'elle a été améliorée); ils comprennent les emplois liés à l'exploitation et à l'entretien de la route.

Les effets directs sur l'emploi ont été obtenus à partir de projections basées sur les informations fournies par les différentes entreprises de construction réhabilitant les sections de la route M1. Le modèle structurel de développement durable (SMSD) de l'OIT est utilisé pour calculer l'impact sur les emplois temporaires et permanents. Ce modèle repose sur la Matrice de Comptabilité Sociale (MCS) du Malawi établie en 2014 par l'Institut International de Recherche sur les Politiques Alimentaires (IFPRI), qui contient des informations sur la production, la génération de revenus, la distribution et l'utilisation des produits. Le modèle est calibré avec les informations provenant de la MCS et d'autres statistiques nationales. Le mécanisme d'ajustement au niveau sectoriel, reflétant les caractéristiques d'une économie en développement à faible revenu est un élément-clé du modèle.

Les résultats de l'évaluation ex-ante indiquent que la mise en œuvre du projet de route M1 peut créer 3 932 emplois directs, comptabilisés en nombre de personnes. La plupart de ces emplois s'adressent à des hommes jeunes dont le niveau de compétence varie selon les groupes. Les femmes travaillant sur l'ensemble des lots présentent un écart négatif par rapport au taux d'emploi moyen des femmes dans le secteur de la construction. Étant donné que le secteur de la construction est déjà confronté à un faible taux d'emploi des femmes, ce biais négatif est préoccupant et suggère que des efforts peuvent être faits pour promouvoir l'emploi des femmes.

L'impact probable sur l'emploi temporaire est important avec la création potentielle de 11 977 emplois temporaires. La plupart de ces emplois seraient générés dans le secteur du commerce de détail, suivi par celui de la santé et du domaine social. Les emplois temporaires peuvent avoir tendance à favoriser les jeunes et les travailleurs qualifiés, tandis qu'aucun biais n'est constaté envers les femmes. L'effet macroéconomique temporaire estimé du projet comprend une croissance réelle du PIB et de l'emploi, accompagnée d'une inflation et d'une amélioration du solde des administrations publiques, ainsi que des balances privées et commerciales (en pourcentage du PIB). Tous les ménages agricoles ruraux voient leur revenu réel augmenter d'environ 2 pourcent.

L'achèvement du projet (une fois la route réhabilitée) améliore la conjoncture avec un niveau d'activité économique plus élevé ainsi qu'une production plus importante et des emplois plus nombreux. En d'autres termes, l'économie connaît une "expansion de capacité" dans le secteur des transports, ce qui entraîne des effets d'entraînement sur le reste de l'économie. L'effet de capacité réduit la contrainte de production dans le secteur des transports, ce qui pousse l'économie vers un niveau d'activité plus élevé avec davantage de production et d'emplois. L'emploi généré par l'effet de capacité est "permanent" dans le sens où il est généré par les résultats à long terme du projet et non par la main-d'œuvre demandée pendant la mise en œuvre du

projet. En utilisant le concept bien établi de ratio de production de capital supplémentaire (ICOR), l'effet permanent du projet M1 sur l'emploi s'élève à 2 950 emplois (en nombre de personnes), la plupart d'entre eux étant générés dans le secteur des transports, suivi par le secteur du commerce de détail.

Les emplois permanents tendent à favoriser les femmes, les jeunes et les travailleurs qualifiés ; toutefois, l'ampleur de ce biais positif est plus importante pour les travailleurs qualifiés. L'effet macroéconomique engendré par l'achèvement du projet comprend une croissance réelle du PIB et de l'emploi, accompagnée d'une amélioration du solde réel des administrations publiques et du secteur privé, et d'une légère détérioration de la balance des opérations courantes (en pourcentage du PIB). Bien que les ménages de tous les groupes et catégories de revenus connaissent une croissance de leur revenu réel, les ménages ruraux non agricoles des premiers et deuxièmes quintiles enregistrent la plus forte croissance de leur revenu réel, de l'ordre de 0,7 pourcent.

En résumé, on estime que le projet de réhabilitation de la route M1 aura un impact positif substantiel sur l'emploi. Bien que la plupart des emplois générés entrent dans la catégorie des emplois "temporaires", ces travailleurs pourraient acquérir l'expérience et les compétences nécessaires dans le cadre de ce projet, ce qui les rendrait par la suite employables dans des projets nécessitant des profils similaires. Ainsi, ils pourraient contribuer au renforcement des compétences dont l'économie malawienne pourrait bénéficier après l'achèvement du projet de la route M1. Les effets sur l'emploi permanent pourraient être encourageants car ils s'accroissent sur le long terme et sont relativement formels. En outre, ces emplois sont également susceptibles de résoudre les problèmes d'emploi des jeunes femmes, fréquents dans les pays d'Afrique subsaharienne, car ils ont tendance à favoriser les femmes et les jeunes travailleurs. Le déséquilibre négatif entre les sexes dans les emplois directs générés par le projet est un sujet de préoccupation car ils sont encore plus forts que dans l'ensemble du secteur de la construction, généralement à dominance masculine. Les inégalités homme-femme observées dans les emplois directs pourraient être corrigées à court terme par des pratiques d'embauche prêtant attention à cette problématique. En outre, les politiques à long terme telles que les politiques en matière de lieu de travail, d'éducation et de formation peuvent encourager davantage de travailleuses à participer à la population active et à opter pour des emplois dans ce secteur.

1. Introduction

STRENGTHEN2 is a joint initiative of the European Union (EU) and the International Labour Organization (ILO) that focuses on leveraging employment impact assessments to promote the creation of more and better jobs in sub-Saharan African countries. The STRENGTHEN2 project is currently conducting a series of in-depth employment impact assessments on European Fund for Sustainable Development Plus (EFSD+) projects in sub-Saharan African countries. The EFSD+ has recently implemented several projects across various sectors in Malawi. One of these is the M1 road rehabilitation project, which aims at fostering regional integration by expanding intra-African trade, strengthening growth, and reducing the time and cost of transport along the corridor. More generally, the project intends to contribute to transforming Malawi into a middle-income country by 2063. It consists of the rehabilitation, widening and marginal alignment of about 300 kilometres (km) of the road in the following sections: Kacheche-Chiweta (66 km); Jenda-Mzimba (47 km); Kasungu-Jenda (86 km) and Kamuzu International Airport (KIA)-Kasungu (102 km). The project started in 2022 with a total budget of €191 million and an EU contribution of €134 million through the European Investment Bank (EIB).

Since the implementation of the project started in 2022 and most of it will be completed in 2024, an ex-ante assessment is conducted in this report. The available information allows three kinds of employment impacts to be obtained: direct, temporary, and permanent. The direct employment effect is defined as the employment generated due to the implementation of the project as related to the total labour costs of the project (that is, workers hired by the construction companies). Temporary employment is defined as the employment generated due to the implementation of the project related to the purchase of domestic intermediate goods used during the duration of the project. Permanent employment is the employment generated by longer-lasting outcomes of the project (for example, an improved transportation system and higher transportation capacity), which pushes the economy to a higher equilibrium with higher output and employment.

The direct employment effects were obtained from projections using information provided by the construction companies across the rehabilitated sections of the M1 road. To obtain the temporary and permanent effects we use the Structural Model for Sustainable Development (SMSD), an economy-wide modelling framework developed at the ILO. A country-specific model for Malawi was constructed using its Social Accounting Matrix (SAM), which reflects the socio-economic structure of the economy. The M1 road rehabilitation project investment is translated into a shock to the model to simulate the temporary and permanent job impacts caused by the project, based on information from project documents.

The report has the following structure. Section 2 provides an overview of the socio-economic and general development situation in Malawi. Section 3 highlights the key information about the M1 road rehabilitation project. Section 4 introduces the assessment model as well as the underlying data. Section 5 presents and discusses the employment impact assessment results. Section 6 contains the conclusion of the report.

2. Malawi country situation analysis

Malawi is a landlocked Southern African country that spans over 118,484 square kilometres of land area. With a subtropical climate, the country shares borders with Mozambique, United Republic of Tanzania, and Zambia; its total population is estimated at 20.44 million in 2022 (UNFPA 2022). The rate of population growth is estimated at an average of 2.7 per cent per annum from 3.79 million in 1960 to 18.91 million in 2018 (World Bank 2022). If this trend persists, the Malawian population is expected to double by 2038.

Malawi has implemented significant economic and structural reforms to foster economic growth, yet it remains one of the slow-growing nations in the last decade. Real gross domestic product (GDP) growth averaged 1.5 per cent per annum between 2000 and 2019 (see figure A1 in Annex 1). The country's economic structure is heavily reliant on the agriculture sector, which employs 62 per cent of the working population and generates 90 per cent of foreign exchange earnings. This reliance makes the economy vulnerable to external shocks, particularly those caused by climate-related factors. In 2020, the agriculture sector contributed 22.71 per cent to Malawi's GDP, while the industry and services sectors contributed approximately 18.49 per cent and 52.62 per cent, respectively. Due to the combined impact of external and local shocks from the COVID-19 pandemic, Malawi experienced a contraction in GDP growth, falling from 5.4 per cent in 2019 to 0.9 per cent in 2020 (World Bank, 2022). While there was a modest recovery in 2021, with GDP growth of 2.2 per cent, it still fell below pre-pandemic levels. However, this recovery was short-lived, as the GDP growth rate declined to 0.9 per cent in 2022, equivalent to a 1.8 per cent decline in per-capita GDP (World Bank 2023).

Malawi's debt-to-GDP ratio has been increasing in recent years, rising from 21 per cent in 2010 to 37 per cent in 2019, making the country highly vulnerable to debt distress (World Bank 2022). As of 2020, Malawi's external debt stood at approximately US\$3.2 billion, equivalent to about 41 per cent of the country's GDP. The Government has been relying on domestic financing and non-concessional borrowing from regional development banks, resulting in a significant increase in public debt from 32 per cent in 2013 to 55 per cent of GDP in 2020. However, the Government has committed to budgetary restructuring, as seen in its 2023 budget. It aims to reduce the overall fiscal deficit in 2022/23 to 7.7 per cent of GDP from 8.7 per cent of GDP in 2021/22 (World Bank 2023). The Government also plans to reduce the Affordable Inputs Program which has contributed to deficits in recent years, and to increase public investment through foreign-financed projects.

Despite the Sustainable Development Goals' target to eradicate extreme poverty globally by 2030, Malawi continues to have a poverty rate of over 70 per cent. The proportion of Malawians living below the international poverty line declined from 71.7 per cent in 2010 to 70.3 per cent in 2016 but has since risen to 74 per cent due to weather-related shocks affecting agricultural productivity and incomes (World Bank 2022). Poverty is most prevalent in rural areas, particularly in the southern and northern parts of the country. Limited access to education and production assets, as well as shocks affecting agricultural productivity, and lack of diversification and access to markets, are among the drivers of poverty. Malawi's trade is unstable due to export restrictions and a lack of infrastructure, and as a landlocked country it has high transportation costs for imports and exports that increase the cost of production, making Malawian goods and services uncompetitive on the international market.

Malawi's infrastructure backbones follow the north-south axis running parallel to Lake Malawi. Regional transport connectivity is quite limited, as evidenced in the Roads Authority (RA) five-year Strategic and Business Plan (see table A1 in the Annex). The main method of transportation is by road, with 90 per cent of goods and 70 per cent of passengers using this method of transportation for local and international destinations. The country's road network is 15,451 km long but only 28 per cent is paved, of which 36 per cent is in good condition; 40 per cent is in fair condition and 24 per cent is in poor condition. The remaining 72 per cent of the road network is composed of earth/gravel surface roads.

Moreover, Malawi is increasingly subject to energy stresses. More than 90 per cent of the country's total demand for energy is met with firewood and charcoal. The main source of electricity is hydropower which generates about 95 per cent of the power in the country. Borgstein et al. (2018) note that Malawi has an exceptionally low national electrification rate estimated at 12.0 per cent - the lowest in the Southern Africa Development Community (SADC) region. It trails Madagascar and Mozambique, which are at 23 per cent and 24 per cent respectively. Rural and urban electrification rates are estimated at 3.9 per cent and 48.7 per cent. Installed generation capacity as of October 2017 was 367.3 megawatts (MW - 350.8 MW being hydro and 16.57 MW thermal diesel generators) against a peak demand of over 470 MW. This inadequate infrastructure has hampered Malawi's economic prospects and competitiveness. While these constraints cut across all types of infrastructure, they are more overt in information and communication technology (ICT), energy and water supply.

Malawi is grappling with the significant challenges of unemployment and underemployment. The national average unemployment rate is 21 per cent of the population and 23 per cent for the youth (Malawi 2021). Moreover, the vast majority of the working population, around 89 per cent, are engaged in informal employment, with women more likely to be employed informally than men (Gondwe and Budlender 2019). The agricultural sector, in particular, relies heavily on informal employment, employing over 60 per cent of the total workforce, with 42.7 per cent being women. It is worth noting that the share of employment in agriculture has been declining, from around 87 per cent in the 1970s to approximately 62 per cent in 2021 due to "push factors" such as population growth and soil degradation, rather than "pull" factors (World Bank 2018). Conversely, the service sector has witnessed a growing trend in employment (see figure A2 in Annex 1), particularly among women, increasing from 8 per cent in 1991 to 15 per cent in 2019, indicative of its rising contribution to the GDP. The industry sector (which includes the construction sector) is the smallest, employing only 8 per cent of the workforce, with women accounting for only 10.2 per cent of this share.

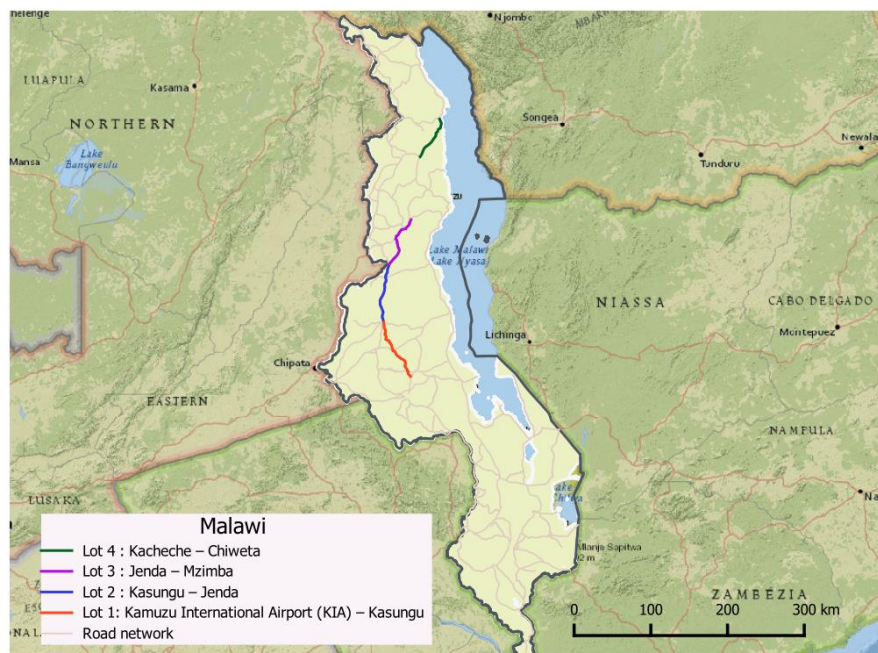
Overall, Malawi's economy continues to heavily rely on subsistence and rainfed agriculture. For example, 94 per cent of farmers produce maize solely for their household needs. This limits Malawi's growth potential and makes it susceptible to climatic shocks (World Bank 2018). Trade policies and an unpredictable business environment continue to impede investment and commercialization, as does the erratic electricity supply. The national development frameworks such as Malawi 2063 and Malawi Growth Development Strategy (MGDSIII) have highlighted infrastructure development as a key component in the development of the country (Malawi 2017). However, the perceived quality of infrastructure remains low, as are the measures for access and service delivery in the education, electricity and roads sectors (IMF 2018). Infrastructure development involves substantial amounts of up-front capital expenditure, which poor governments such as Malawi's struggle to meet given the small tax base, limited room to raise taxes, and declining official development assistance. In Malawi, this is evidenced by the low level of public investment (which averaged 4.18 per cent of GDP between 1998 and 2017). As a result, the public capital stock per capita (a proxy for infrastructure stock) grew at a compound annual growth rate of only 0.88 per cent during the same period. Increasing public investment in a low economic growth scenario can be associated with fiscal risk, which could negatively impact the country's debt management and stabilization policy. Malawi's public investment therefore remains low and of mixed quality, resulting in an infrastructure investment gap in the energy, water and sanitation sectors of approximately US\$332 million per year (Hettinger et al. 2020).

3. The M1 road rehabilitation project

The M1 road rehabilitation project consists of a multi-scheme road operation for the rehabilitation of about 300 km of the single carriageway M1 road in Malawi with no changes to the existing alignment. The M1 road in Malawi is part of the SADC's North-South Corridor (NSC), a major regional trade corridor linking the two port cities of Dar es Salaam in Tanzania and Durban in South Africa. Approximately 1,145 km of the North-South Corridor passes through Malawi via the M1 road. The corridor is also prioritized by the Program for Infrastructure Development in Africa (PIDA), as well as by the Common Market for Eastern and Southern Africa (COMESA) to promote socio-economic development and poverty reduction in Africa through improved access to integrated regional and continental infrastructure networks and services.

The project consists of civil works along four distinct road sections, identified from north to south as follows: Kacheche-Chiweta (66 km), Kamuzu International Airport (KIA)-Kasungu (102 km), Kasungu-Jenda (86 km), and Jenda-Mzimba (47 km) (figure 1). The Kacheche junction to Chiweta section is part of the road that links Malawi to the port of Dar es Salaam and as such forms a vital link for the importation of strategic goods. The road provides a link between Malawi and Dar es Salaam while also providing an alternative link to the same port for Zambia. Zambia's Eastern Province especially makes use of this and other sections of the M1 road to take advantage of the shortest route to the port for import of agricultural inputs and export of agricultural produce. The need for the improvement arises from the increased levels of traffic using the facility, the high presence of pedestrian and bicycle traffic in urban areas, and the structural condition of the existing paving which is either nearing or has reached the end of its serviceable life.

► **Figure 1. M1 road rehabilitation project map**



Source: Malawi road network (RCMRD GeoPortal 2015), Malawi country boundary (GADM 2022).

According to the project documents, the rehabilitation of the four different sections of the M1 road will cost €120 million. Each road section (Lot) is rehabilitated by a foreign company, three Chinese and one Portuguese. The project is entirely funded by the European Union through the EIB and the funding is distributed as follows: €44 million, €32.2 million, €11.5 million, and €31.8 million respectively to Kacheche-Chiweta (66 km), Jenda-Mzimba (47 km), Kasungu-Jenda (86 km), and Kamuzu International Airport (KIA)-Kasungu (102 km). The project is expected to be implemented over a period of 36 months.

In sum, the project is expected to: (i) foster regional integration by providing a vital link to the port of Dar es Salaam and increase intra-Africa trade, as the road forms part of the COMESA North-South Corridor; (ii) provide socio-economic benefits to the areas along the road, estimated within 15 to 20 years; and (iii) reduce the time and cost of transport along this regional strategic corridor, enabling faster and smoother traffic flows, more reliable travel times, and vehicle operating cost savings.

4. A structural model for employment impact assessment in Malawi

This section focuses on the method used to obtain the temporary and permanent employment effects. The direct effects will be discussed in section 5. Since temporary and permanent employment effects are not directly observable (for instance, via surveys), we need to rely on abstract methods to measure these effects. Data-demanding methods (such as econometrics) are difficult to apply due to lack of quality data available. Thus, to obtain the temporary and permanent employment effects we use a simulation method.² This requires the construction of a macroeconomic model to simulate the employment effects of the M1 investment project. The current model is a representation of the Malawian economy based on the country's Social Accounting Matrix (SAM) and contains well-specified causal and adjustment mechanisms in the form of a system of equations. The SAM provides the fundamental accounting structure of the model as well as the "base year" data for the calibration and simulation.

In comparison with econometric methods, simulation methods are generally less data-demanding and allow the modeler to consider key features of developing countries such as export commodity dependence, high unemployment and sectoral constraints.³ However, a model based on a poorly represented economy might yield meaningless simulation results. Given the complexity of this type of model, a common criticism is lack of transparency. For these reasons, we dedicate the following sections to explaining the components of the macroeconomic model constructed for this study.

4.1. The Social Accounting Matrix (SAM) for Malawi

The Social Accounting Matrix (SAM) is an economy-wide data framework that captures economic transactions among different "actors" of the economy (such as households, businesses, and the government) over a period of time. These transactions are captured in a squared matrix where each account is represented by a row and a column. Each cell of the matrix reflects a payment flow from the column account to the row account (elements on each column are expenditure flows to other accounts and elements on each row are income flows from other accounts). Thus, a SAM is a snapshot of the socio-economic structure of an economy represented by a set of interlinked accounts that record the incoming and outgoing resources of different actors in the economy (European Commission 2003). This framework is a valuable tool for analysing the economy-wide impacts of policies and shocks.

The 2014 Malawi SAM was constructed as part of the Nexus Project, an initiative led by the International Food Policy Research Institute (IFPRI) and national statistical agencies to improve the quality and establish common data standards and classification systems for constructing and updating national SAMs. The accounts contained in the 2014 Malawi SAM are "activities and commodities", where the domestic production is separated into 70 activities.⁴ Activities and commodities have a one-to-one mapping based on a concordance between ISIC industries and the Harmonized System, version 2007 (World Customs Organization 2007). Activity accounts are valued at producer prices and commodity accounts are valued at market prices.

The "factors of production" account contains three broad categories: labour (rural and urban, disaggregated by level of education), land, and capital (disaggregated by crops, livestock, mining, and other sectors). The "households" account is separated into 15 household groups, first broken down into urban and rural. Rural households are further disaggregated into farm households and non-farm households. Households are further disaggregated into per capita expenditure quintiles. The remaining accounts in the SAM include the transaction costs of moving goods between producers, domestic markets and national borders, as well as the various indirect taxes imposed on marketed commodities.

The Malawi Macro SAM is constructed using three main data sources: national accounts rebased using a 2010 base year, government finance using the International Monetary Fund's Government Finance Statistics Manual 2014 (GFSM2014), and the balance of payments derived from the Balance of Payments and International Investment Position Manual, sixth edition (BPM6) database (IMF 2009). The national accounts provided GDP estimates for 19 Nexus sectors, which were disaggregated into 70 sectors using crop production and price data from FAOSTAT (an FAO database) and industrial GDP estimates published in Malawi's Annual Economic Survey Report 2011-2012. The national accounts also provided sufficient detail

² See Gibson and Flaherty (2017) for a review of other methods/techniques.

³ For a more detailed discussion on methodology see Jiang and La Marca 2023.

⁴ Some countries' national accounts capture how activities can produce multiple commodities – this information is discarded in Nexus SAMs.

for service sector GDP. The commodities were derived from expenditure groups of the national accounts disaggregated using Integrated Household Survey (IHS3) data, the Commodity Trade Statistics (COMTRADE) database, and other sources. Labour value-added and household incomes and expenditure were disaggregated across representative sectors and household groups using the IHS3 data.

The STRENGTHEN2 team has compiled employment data (disaggregated by sex, skills, and age groups) based on Global Trade Analysis project (GTAP) SAMs, which have different sector specifications from IFPRI. Hence, to use our data on employment we matched the IFPRI SAM sectors with the GTAP SAM sectorial disaggregation. Using information from IFPRI SAM also allowed us to leverage the household group disaggregation (rural and urban) contained in this SAM. This allows us to obtain the temporary and permanent effects of the M1 project on real household income.

4.2. The model for Malawi

The 2014 Malawi SAM provides the key set of macro accounting relationships for the Malawi model. Hence, the model is rooted in the accounting identities expressed in the SAM (incomes equal to expenditures), representing the existing productive and distributive structure of the economy. This is also supplemented with additional behavioural relationships and adjustment mechanisms (closure rules) to build the model. In the following paragraphs we provide a brief description of the key elements and adjustment mechanisms for the model.

The model has three types of sectors:

1. The **agricultural sectors** are assumed to be constrained by the availability of capital and fertile land; hence they have a fixed domestic supply. As demand changes, prices adjust to clear the market with flexible profit share.
2. **Utility and transport sectors** are constrained by fixed capacity; hence their domestic output is fixed. However, an investment operation would most likely build capacity in these sectors, which ultimately pushes the economy to a higher steady state generating long-term or permanent employment, as discussed in section 5.
3. **Other sectors'** (including manufactures, construction, and other services) domestic products are free to adjust to demand; in other words, their production is "demand-driven". This is due to firms in these sectors operating with excess capacity due to the existence of a large pool of un- and underemployed workers, and firms would determine their selling price based on a mark-up over the cost of production. Any changes in production costs (such as wage or price of intermediate inputs) would affect the price in these sectors via a cost-push.

Since Malawi has persistent high levels of labour underutilization, we assume that labour supply is unlimited at an exogenously determined wage rate. Productivity is considered fixed, while employment and income are generated by additional levels of domestic industrial activity, which depend on the demand for domestic products and the product mix of each industry. Prices and the distribution of income determine the demand for goods and services in this model. Tax rates are assumed to be fixed, so the government budget balance adjusts in response to an intervention. The current account adjusts freely assuming a fixed nominal exchange rate, whereas the real exchange rate still adjusts with price. In response to an intervention, the saving-investment balance is restored with incomes adjusting to generate the right amount of savings to meet investment.

Another key feature of the model is that the investment operation can build additional capacity for sectors with fixed short-run output (such as the transport sector). The additional capacity can increase the output level of that sector, hence removing the output constraint. This feature allows the long-term economy-wide (including employment) effects of the investment operation to be captured.

4.3. Setting the parameters in the model

The model is constructed based on the 2014 Malawi SAM. Most of its parameters are set endogenously in such a way that the base line solution to the model reproduces the values in the SAM. In other words, the model is "calibrated" to the 2014 SAM.⁵ Parameter values such as the nominal exchange rate, foreign price and basic price are normalized to one, which is equivalent to rescaling the quantity to a conforming unit of measure. Prices such as the unitary price of activities and purchaser's price are obtained from the SAM data. Employment-related parameters are mostly obtained from the GTAP satellite account containing employment data by skill levels and occupational profiles of labour income. Labour statistics from the ILO's ILOSTAT database expands the GTAP-consistent sectoral employment data to include age, sex, and informality.

⁵ The STRENGTHEN2 team is currently working on methods to update the SAM (for example, using cross-entropy methods).

Estimating the elasticity of substitution between domestic and foreign products (the Armington elasticity) can be a challenging task for a developing economy such as Malawi. The Armington elasticities used in computable general equilibrium (CGE) models are often substantially higher than those found in empirical studies, in order to generate the level of trade that is high enough to match reality (Gallaway, McDaniel and Rivera 2003). For example, the GTAP sets it at around 3.1 on average, which is substantially above the empirical average (around 1.4). Studies have also found that the Armington elasticity is correlated with the level of development of the country, such as per capita GDP and degree of urbanization (Mijnen 2013). Since Malawi is a small developing economy, we set elasticity to 3, taken from the GTAP. The export price elasticity in this model is set to be 0.75, as in the Raza et al. (2016) model for sub-Saharan African countries.

The demand functions that capture households' consumption are of the Linear Expenditure System (LES) type. We follow Taylor (1979) for calibrating the LES, which requires first obtaining the Frisch parameter and Engel's elasticity, and then these parameters are used to calibrate the floor consumption levels and the supernumerary income shares. The Frisch parameters for the 15 households are assumed to range between -10 (for the poorest households) and -1.5 (for the richest households); these values are based on the findings by Chuku et al. (2019) and Goldberg (2016). The by-sector by-household Engel's elasticities are taken from microeconomic analysis based on the study for Zambia conducted by Jiang and La Marca (2023).

5. The direct, temporary, and permanent employment effects of the M1 project

5.1. The intervention

According to the M1 road rehabilitation project documents, the cost dedicated to the rehabilitation of the four different sections of the M1 road amounts to €120 million. Using project documents and information collected from the construction companies, we obtained total labour costs as well as monthly employment reports which were the main source of information to calculate the direct employment effects. At the time the data was collected, the project had been going on for six months. We used this information to project the direct employment generated during the total duration of the project (36 months).

The bill of quantities allowed us to determine how the total project cost is distributed between different sectors in the SAM. This expenditure breakdown did not contain the total labour costs since this information was already reflected in the direct employment effects. Instead, we focused only on the cost of purchasing intermediate goods (except labour) to calculate the temporary and permanent employment effects. The cost contained in the expenditure breakdown was first converted to the same base year as the SAM using both GDP deflator and exchange rate, and then the expenditure breakdown was modelled as a shock - additional purchase of capital goods from different sectors of the economy to build additional capacity for the transport sector. Since the project cycle lasts for 36 months according to the project documents, in the dynamic simulation the project cost is injected in the economy over a time horizon of three years.

Given the type of information we obtained from the project documents and the construction companies, we were able to obtain three kinds of employment impacts: direct, temporary, and permanent. In this framework, a direct employment impact is defined as the employment generated due to the implementation of the project as related to the total labour costs of the project (that is, workers hired by the construction companies). Temporary employment is defined as the employment generated due to the implementation of the project as related to the purchase of domestic intermediate goods used during the duration of the project. For example, jobs could be generated in sectors where intermediate goods for the project are produced (such as the mining and retail trade sectors) to meet demand from the project. Also, the employment generated is “temporary” because once the project ends, holding everything else constant, those specific jobs will be lost.

Permanent employment in this framework is employment generated by longer-lasting outcomes of the project. For example, the outcomes of the project are an improved transportation system and higher transportation capacity, which provides the economy with cheaper transportation costs (in terms of time and money) and an improved regional trade corridor. Thus, the completion of the project pushes the economy to a higher equilibrium, with higher output and employment.⁶ It is also important to highlight that the model captures the effect on employment demand (due to the implementation of the project) and not on the actual employment status of the individuals. Thus, “temporary” or “permanent” refers only to employment demand from the perspective of the project duration.⁷

5.2. Direct employment effects

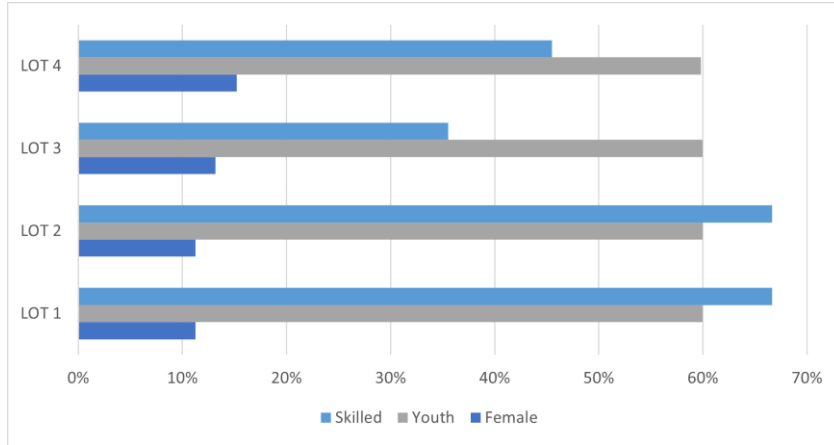
Our estimates are provided in headcounts and indicate that during the implementation of the M1 rehabilitation project, 3,932 workers can be employed directly across the four lots. Approximately 11 per cent of the employees in all the lots can be female, as shown in figure 2. Lot 4 has the largest share of female workers at 15 per cent of the total employment generated. Additionally, workers aged 15 to 35, considered as youth workers, constitute 60 per cent of the total workforce across all the lots. However, when it comes to skilled workers, Lots 1 and 2 have a higher percentage of skilled workers compared to Lots 3 and 4, which

⁶ The model produces the “temporary” and “permanent” effects assuming a *ceteris paribus* environment (that is, other conditions remaining the same). However, unaccounted exogenous shocks (outside the project intervention) can prevent those effects from truly persisting over time.

⁷ Although workers employed in the project will benefit from the skills acquired during the project, which will increase their employability, the model does not capture this effect.

are below 50 per cent. Approximately 67 per cent of the workers in Lots 1 and 2 are skilled, while Lot 3 employs only 36 per cent of skilled workers.

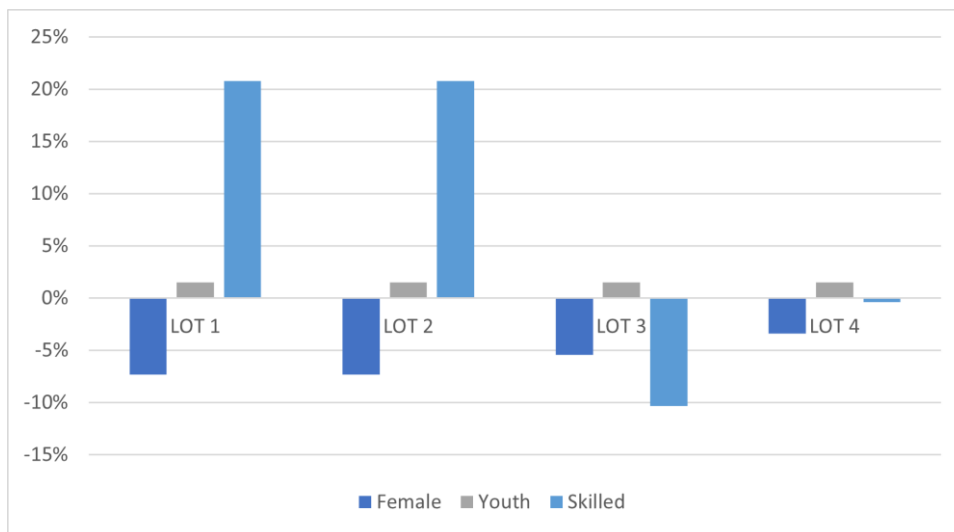
► **Figure 2. Direct employment generated, by age, sex and skill**



Source: Authors' calculation.

By comparing the demographic distribution shown in figure 2 with the corresponding construction sector shares, we can acquire an overall understanding of the degree of bias in the jobs generated. It is evident that the implementation of the M1 project results in a small positive bias towards youth in all the Lots and towards skilled workers for Lots 1 and 2, since the percentage of youth and skilled employment generated by the project at these Lots is higher than the construction sector shares. This is highlighted in figure 3, where all Lots show a 1 per cent higher employment of youth relative to the national construction sector share, and Lots 1 and 2 exhibit a 21 per cent higher employment of skilled workers. Lot 3, on the other hand, shows a negative bias of 10 per cent in skilled workers' employment relative to the construction sector share, implying a labour-intensive Lot compared to the other Lots. However, with regard to female workers all Lots demonstrate a negative discrepancy ranging from 3 to 7 per cent compared to the average female employment rate in the construction sector. Considering that the construction sector already struggles with a low female employment rate of 18.6 per cent, the negative bias found in this study is concerning and suggests that there is room for efforts towards promoting female employment.

► **Figure 3. Construction sector employment bias, by age, sex and skill**



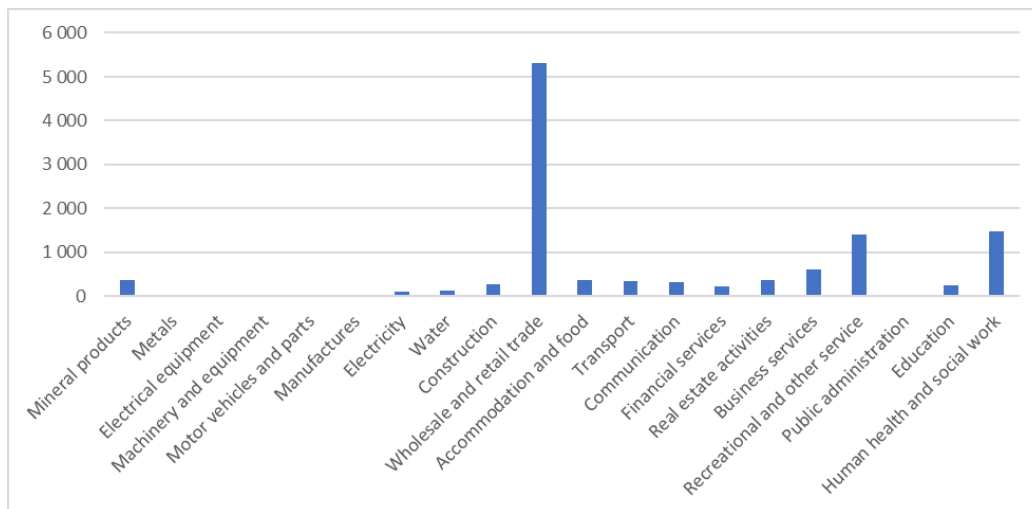
Source: Authors' calculation.

5.3. Temporary employment effects

The M1 project has a sizeable likely impact on temporary employment, resulting in the potential of 11,977 temporary jobs (in headcounts) being created. This increase is primarily driven by the direct expenditure of the project in the Malawian economy, through the increased demand for intermediate goods and services

utilized in road construction. As can be observed in figure 4, most of these jobs would be generated in the wholesale and retail trade sector with 5,300 jobs, followed by the human health and social work sector, and the recreational and other service sectors with 1,465 and 1,400 jobs respectively. It is important to mention that the wholesale and retail trade sector captures the sale (without transformation) of any type of goods and the rendering of services in relation to the sale of these goods. Since around 80 per cent of the total expenditure on intermediate goods is used to purchase four goods and services (petroleum and mineral products, electrical equipment, and land transport services), it would not be surprising that the temporary employment effects benefit mostly intermediaries reselling the intermediate goods and services demanded by the project.

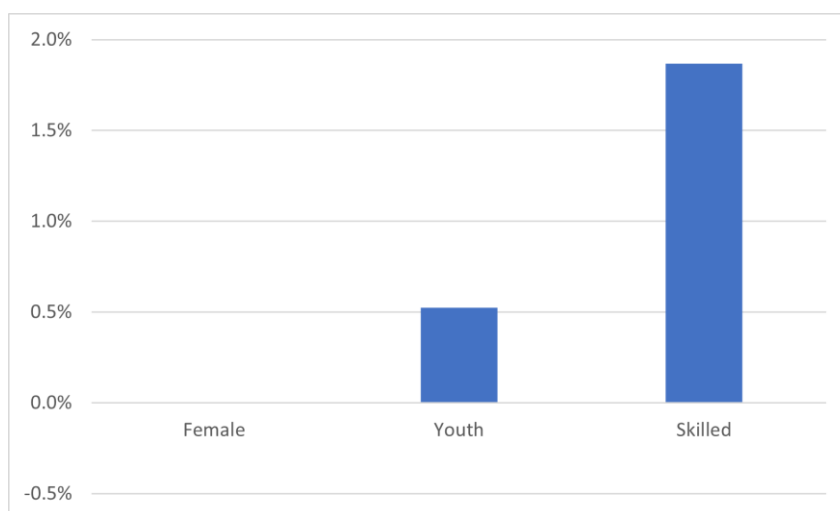
► **Figure 4. Temporary employment generation, by sector**



Source: Authors' calculation.

Of the total temporary employment generated, 44 per cent is expected to be female, 22 per cent young workers aged 15 to 35 years old, and 23 per cent skilled workers. To assess the degree of bias in the jobs generated, we compare the percentages of female, youth, and skilled employment generated by the M1 project with their corresponding national shares. It is found that the M1 project maintains a ratio of female employment similar to the national average. However, the project may tend to generate more temporary jobs for youth and skilled workers than the national average, an increase of 0.5 and 1.9 per cent respectively (figure 5).

► **Figure 5. Temporary employment bias, by age, sex and skill**

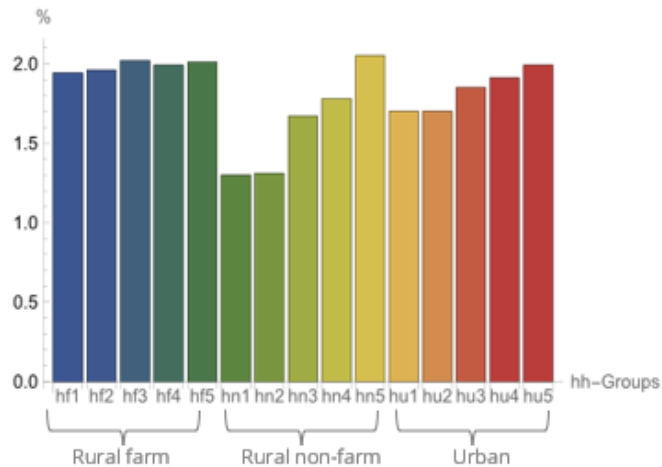


Source: Authors' calculation.

Since our model contains household level and macroeconomic data, we can examine the temporary effects of the M1 project on real household income and other macroeconomic variables. Figure 6 shows the potential

effects (in percentage change) of the M1 project on real income growth by various household categories (rural farm: hf; rural nonfarm: hn; and urban: hu, by income quintile).

► **Figure 6. Temporary effects on household real income growth**



Source: Authors' calculation.

From figure 6, it is evident that the M1 project may generate a real income growth of about 2 per cent across all rural farm household categories. A 2 per cent increase may also be observable in rural non-farm households and urban households only in the highest quintile. Finally, table 1 presents the estimated effects on key macroeconomic variables.

► **Table 1. Temporary Macroeconomic effects**

Indicator	% Change
Real GDP	1.76
Inflation	0.52
Employment	0.19
Government balance	8.06
Trade balance	0.82
Household (private) balance	2.07

Source: Authors' calculation.

The results of the simulations show that the M1 project may generate real GDP growth and employment growth accompanied by inflation. The GDP growth might be relatively large due to the various goods and services required to implement the project. The employment effect, on the other hand, may not be that large; this could be because the expenditure on labour cost in the construction sector was not entered in the model to obtain the direct employment effects of the project. The results also show a potential improvement in real government and private balances, as well as an improvement in the trade balance.

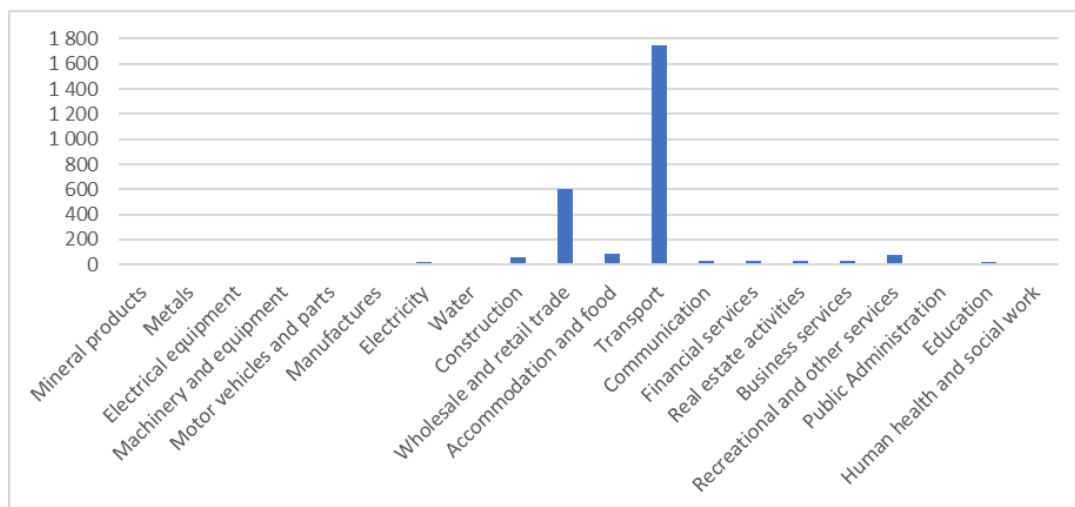
5.4. Permanent employment effects

As mentioned in section 5.1, the permanent effect of the project materializes once the road has been rehabilitated and is in full use. This situation increases the capacity of the transport sector (where output was constrained in the short term). Estimating the permanent effects requires linking the investment to the

increase in capacity (“capacity effect”), which can be a challenging task. To do this, we use the well-established concept of Incremental Capital Output Ratio (ICOR), which measures how much additional capital is required to produce an additional unit of output. Thus, the inverse of this variable captures how much output capacity could be obtained with an additional unit of investment in the sector under study.

The increase in capital stock in a sector (a stock variable) can be approximated by the investment in that sector (a flow variable), called “investment by destination”. However, the data available from national accounts and input-output tables provide “investment by sources”, which is the total demand of capital goods by each sector instead of “investment by destination” (how much capital accumulation each sector is receiving). This type of information can be found in a SAM with a disaggregated Gross Fixed Capital Formation (GFCF) account where the relationship between the demand of investment goods by source can be captured on the rows and by destination in the columns. While sectoral ICOR is not available at this time, UNCTAD (2014) has calculated and reported the aggregate ICOR for Malawi. To get a rough idea of the permanent (capacity) effect, we decided to use the aggregate ICOR for the transport sector with the assumption that the size of the transport sector’s ICOR is not too different from the aggregate one. The estimation from UNCTAD (2014) sets the ICOR for Malawi to 3.84.⁸ The additional transport capacity built by the M1 project pushes the economy towards a higher level of output and employment, permanently in the sense that the economy is at a higher equilibrium level of activities. This employment effect is estimated in headcounts and amounts to 2,950 jobs which are considered “permanent” since they will remain after the project’s conclusion. Figure 7 shows the sectors in which these potential permanent jobs could be created. The majority of the jobs, about 80 per cent, might be generated in the transport and trade sectors where 1,747 and 599 jobs could be created respectively. This result would not be surprising because retail trade sectors tend to depend heavily on the transport sector.

► **Figure 7. Permanent employment generation, by sector**

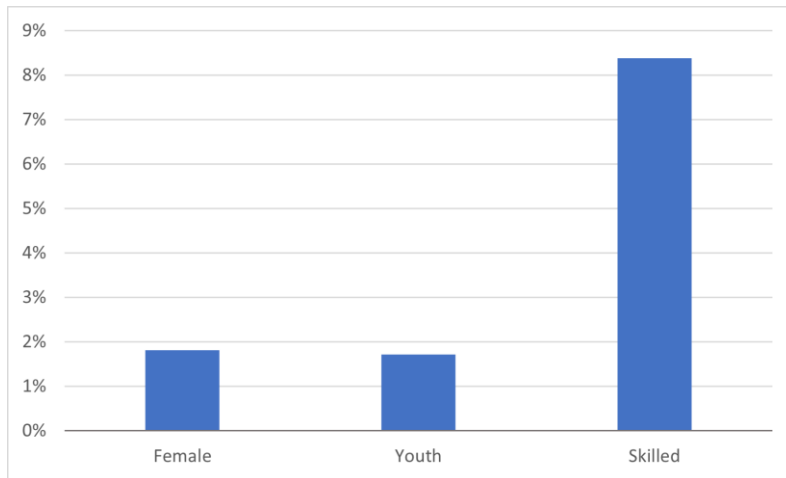


Source: Authors' calculation.

As indicated in figure 8, the permanent employment effects might tend to benefit female, young, and skilled workers relative to the national shares. Furthermore, the biases towards female and skilled workers can be more prominent in the employment generated by the permanent effects than in the temporary ones (1.8 per cent compared to 0 per cent for female workers, and 1.7 per cent compared to 0.5 per cent for youth workers). The most significant difference in bias is for skilled employment, which may increase from 1.87 per cent to 8.4 per cent.

⁸ The STRENGTHEN2 team is working with the National Statistical Office to construct a SAM with proper information on GFCF; this SAM will allow us to estimate the ICOR properly for future assessments.

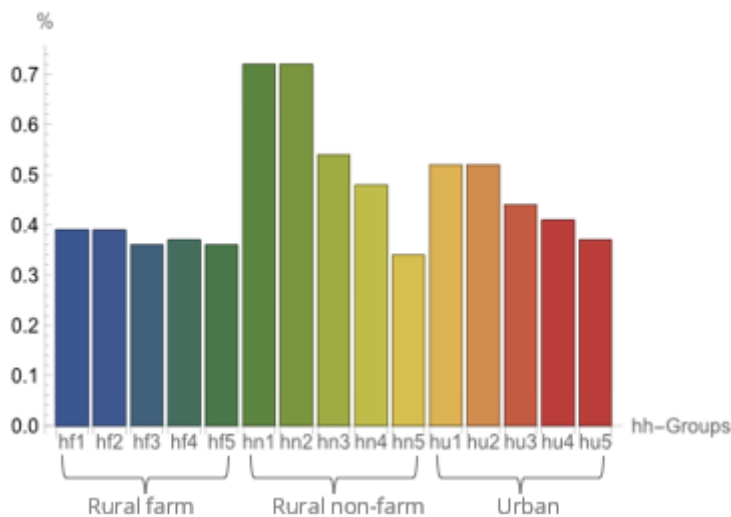
► **Figure 8. Permanent employment bias, by age, sex and skill**



Source: Authors' calculation.

As illustrated in figure 9, the project can affect the real income growth of households, providing about 0.4 per cent growth for the farming rural households, as well as for the higher quintiles of urban households. The higher effect might be observed among the lower quintiles of the non-farming rural households and urban households (0.7 and 0.5 growth, respectively). Although temporary effects generally lead to greater real income growth, it is worth noting that while rural farm households exhibit higher overall growth rates during the project, the long-term impact of the project may lead to larger boosts for poor (low-quintile) rural non-farming households compared to other households. This implies that the permanent impact of road rehabilitation may result in higher income opportunities for rural non-farming households than for other households. Furthermore, for both non-farming rural and urban households, there might be a shift in the households that benefit the most. While high-quintile households can observe the largest boost in the temporary effects from the project's expenditure, the long-term impact of the project can result in a larger boost in real household income growth for lower-quintile households.

► **Figure 9. Permanent effects on household real income growth**



Source: Authors' calculation.

With regard to the potential macroeconomic effects, the completion of the project expands the transport sector's capacity and reduces transportation costs; this may stimulate economy-wide activities, allowing real GDP to grow by 0.42 per cent and employment by 0.05 per cent. This growth may be accompanied by a slight downward pressure on the price level, caused by the reduced transportation costs of goods and services, a cost-pull deflation for all other sectors. Other potential macroeconomic effects may include an improvement in real government and private balances and a slight worsening of the current account balance (as a share of GDP).

▶ **Table 2. Permanent Macroeconomic effects**

Indicator	% Change
Real GDP	0.42
Inflation	-0.34
Employment	0.05
Government balance	0.21
Trade balance	-0.02
Household (private) balance	0.37

Source: Authors' calculation.

6. Conclusion and recommendations

Through the European Fund for Sustainable Development Plus (EFSD+), the European Union is supporting Malawi's M1 road rehabilitation project. The project aims at improving access to trade and essential services, fostering regional integration, strengthening growth, and reducing the time and cost of transport along the COMESA North-South Corridor. This ex-ante employment impact assessment has produced three kinds of estimated employment impacts: direct, temporary and permanent. Direct employment effects were obtained from projections using information provided by the construction companies across the rehabilitated sections of the M1 road. The temporary and permanent job effects were obtained by conducting a simulation exercise using the ILO's Structural Model for Sustainable Development (SMSD), which was calibrated based on the 2014 Malawi IFPRI SAM.

The estimated results are provided in headcounts and indicate that 3,932 direct jobs can be created by the implementation of the M1 road project. Most of them will be for young male workers with varying skill levels across the different lots. A sizeable likely impact on temporary employment is found, resulting in the potential of 11,977 temporary jobs being created. Most of these jobs would be generated in the retail trade sector, followed by the human health and social work sector. The temporary jobs may tend to favour young and skilled workers, while no bias is found for female workers. The estimated permanent employment effect of the M1 project amounts to 2,950 jobs, most of them would be generated in the transport sector followed by the retail trade sector. The permanent jobs may tend to favour female, young and skilled workers; however, the extent of this positive bias might be bigger for skilled workers.

Although the M1 road rehabilitation project is estimated to provide a substantial positive employment impact, certain aspects of this job generation are worth discussing. For example, most of the potential jobs generated by the implementation of the project fall in the category of "temporary". However, this does not need to be the case if those workers gain the necessary experience and skills that can make them employable in projects with similar labour needs. Infrastructure projects such as the M1 road could incorporate skill-building initiatives to strengthen the employability of workers in future projects where their experience and skills are needed. Skill-building initiatives can take the form of apprenticeship programmes where current skilled workers (mostly brought from outside Malawi) teach local workers the required skills.⁹

The fact that most of the temporary jobs can be generated in the wholesale and retail trade sector is an indication that intermediaries might benefit the most from the implementation of the project. Strengthening domestic capacity to produce the goods and services demanded by the project can enhance the job creation potential of infrastructure projects and maximize the creation of domestic jobs. Thus, we recommend the implementation of long-term industrialization strategies focused on strengthening domestic production capacity.

The likely negative gender bias in the direct jobs that can be generated by the project is a source of concern, while not entirely surprising since these jobs belong to the construction sector, which is typically male-biased. The gender bias observed in direct employment could partially be addressed in the short-run by promoting gender-sensitive hiring policies. In addition, long-run policies such as workplace, education, and training policies can encourage more female workers to participate in the labour force and opt for jobs in this sector.¹⁰

The estimated permanent employment effects obtained in this study are encouraging since they show an increase for the long-term and are relatively formal. Since these jobs already tend to favour female and young workers, we recommend that in those sectors where the permanent job creation takes place, labour policies should focus on transforming those jobs into decent jobs.¹¹

It is important to mention that the model used in this study assumes that labour is abundant in every sector. That is for every amount of labour demanded there will always be available workers to do the job. However, for some sectors the labour demanded might not be available due to skill constraints. Thus, a skill gap

⁹ The ILO has years of experience with apprenticeship programmes, see [here](#) for some examples.

¹⁰ For examples of labour policies in this area, see: [Employment Policy Brief: Building a Gender-equitable Future through Employment Intensive Investment Programmes \(ilo.org\)](#) (ILO 2019); and [Illustrated Guidelines for Gender-responsive Employment Intensive Investment Programmes \(ilo.org\)](#) (ILO 2016).

¹¹ For further information on decent job creation in developing countries see: [Malawi Decent Work Country Programme Booklet final.cdr \(ilo.org\)](#); "Rural Development Strategies as a Path to Decent Work and Reducing Urban Informal Employment: The Case of South Africa", [WP-106.with abstracts \(ilo.org\)](#).

analysis can complement this study, and once the skill constraints have been identified, skill-building policies can be implemented at a sectoral level.¹²

The SMSD modelling framework allows us to capture structural features of low-income developing countries such as Malawi. Features such as commodity dependence, sector constraints, uneven distribution of income and high un- and underemployment levels are well captured by the SMSD model. However, certain aspects of the modelling can be improved. For example, the reference SAM utilized in this study dates to 2014 (the latest available). Although the model generates results based on the structure (shares) and not on levels data represented in the SAM, the results could be improved by using a more recent SAM.¹³ The model also assumes constant productivity, which might result in an upward bias in estimating employment outcomes. Empirical studies on the evolution of labour productivity in Malawi could help to overcome this limitation. Currently, the model assumes that labour supply is abundant, with a fixed nominal wage. However, labour abundance and sluggish wage growth do not have to be the case for all labour categories. For example, some sectors might experience a labour shortage due to the lack of skilled workers. Hence, adjustment mechanisms based on different occupational categories can be incorporated in the model. Finally, the level of aggregation of the sectors in the model does not allow the details of the sector where the project is implemented to be captured. Disaggregating the sector in a SAM can be extremely costly, hence careful interpretations of the results are in order. Perhaps complementing the study with a sector-specific analysis can also be of help. Nevertheless, with the present model we obtain useful insights into the potential employment and macroeconomic impacts for the M1 road rehabilitation project, which have allowed us to methodically assess the temporary, permanent and macroeconomic potential effects of the project.

¹² The ILO has experience in providing technical assistance for its constituents in these areas.

¹³ The STRENGTHEN2 team is working with the National Statistical Office to construct an updated SAM with enhanced labour information.

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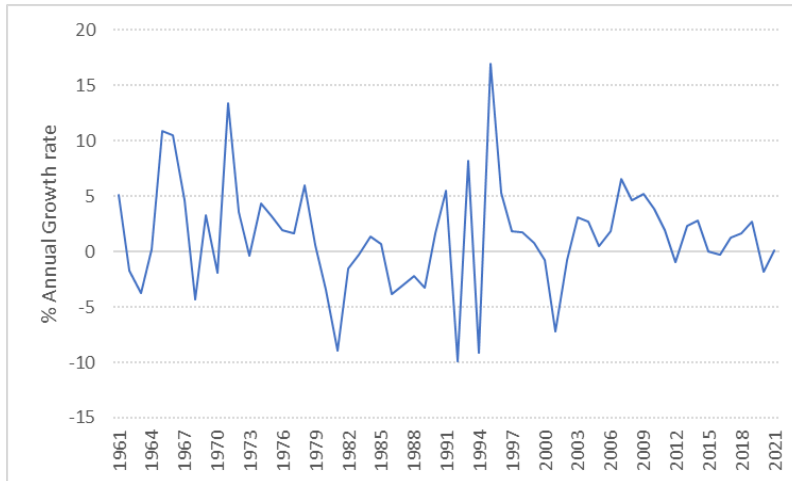
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Annex 1

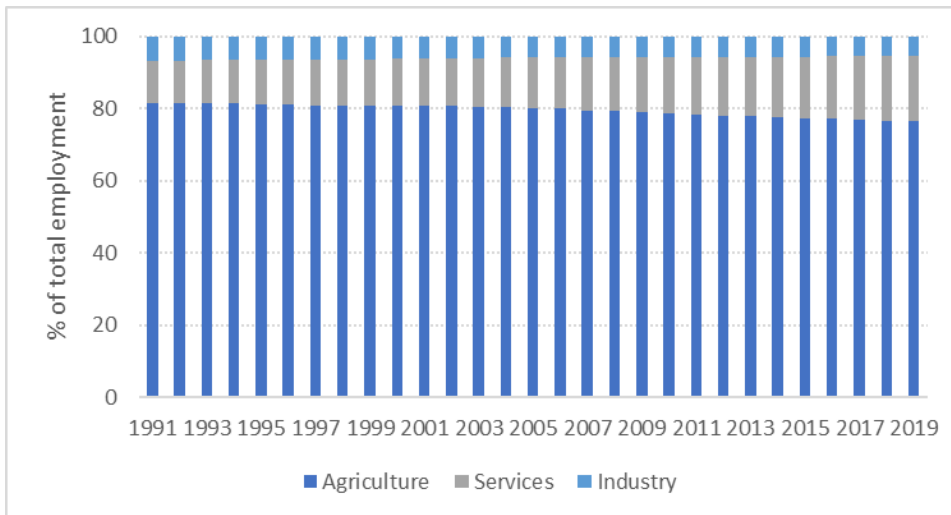
Figures

► **Figure A1. Malawi GDP per capita growth, 1961–2021 (annual %)**



Source: Authors' construction using World Bank data (2023).

► **Figure A2. Malawi employment, by sector, 1991-2019**



Source: Authors' construction using World Bank data (2023) (modelled ILO estimate).

Annex 2

Tables

► Table A1. Malawi road network

Road Cclass	Paved		Unpaved		Total	
	km	% Share	km	% Share	M	% Share
Main	2 976	69.0	381	1.8	3 357	13.5
Secondary	513	11.9	2 612	12.7	3 125	12.5
Tertiary	14	0.3	4 077	19.8	4 121	16.5
District	8	0.2	3 492	16.9	3 500	14.0
Urban	771	17.9	577	2.8	1 348	5.4
Community roads	-	0.0	9 478	46.0	9 478	38.0
Total road network	4 312		20 617		24 929	

Source: RA Five Year Strategic and Business Plan 2017-2022.

► **Table A2. Malawi economic indicators, 2019-23**

	2019	2020	2021	2022	2023
GDP (current, US\$billions)	11.0	11.8	12.2	12.0	11.8
GDP per capita (current, US\$)	544	568	566	544	521
Total investment (% of GDP)	7.8	7.5	8.4	9.8	9.6
Gross national savings (% of GDP)	-4.8	-7.8	-6.3	-4.2	-2.5
General government total expenditure (% of GDP)	19	23	22	23	23
General government gross debt (% of GDP)	45	55	59	65	70
GDP at constant market price	5.6	2.9	2.4	4.0	3.0
Inflation rate (%)	9.4	8.6	9.3	10.7	7.1
Current account (US\$billions)	-1.31	-1.68	-1.92	-1.82	-1.79
Current account (% of GDP)	-11.9	-14.2	-15.8	-15.1	-15.1

Source: Authors' construction using data from the IMF, the World Development Indicators (World Bank 2023), and World Economic Outlook database.

ilo.org

International Labour Organization

Route des Morillons 4

CH-1211 Genève 22

Switzerland

E: villanuevamartinez@ilo.org

E: STRENGTHEN2@ilo.org

