



OXFORD
ECONOMICS

ECONOMIC IMPACT OF OPERATIONS IN PROLOGIS WAREHOUSES

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1. INTRODUCTION

Prologis is the world's largest owner of commercial warehouse space. Prologis customers rent warehouse space from the company, performing logistics, and sometimes light assembly operations in those spaces. These operations associated with Prologis-owned warehouse space generate considerable economic activity, which we estimate in this report using a global economic impact model developed by Oxford Economics.

In particular, we estimate:

- The value of goods (throughput) transiting through Prologis warehouses
- The direct employment engaged in activities in Prologis warehouses themselves
- The full economic impact of these activities in Prologis warehouses, as estimated in:
 - GDP impacts,
 - Employment impacts, and
 - Taxes generated by this economic activity.

These full economic impacts include the activity taking place in the warehouses themselves (direct impact), the supply chain supporting that activity (indirect impact), and the economic activity driven by spending out of wages of those employed directly and indirectly (induced impact).

In 2017, Oxford Economics first estimated the economic impacts of operations in Prologis warehouses. This report updates those earlier estimates based on Prologis's most recently available portfolio of warehouse space, which is current as of June 30, 2020 and includes newly acquired and built portfolio additions. This report also fine-tunes assumptions based on the latest available information.

METHODOLOGY

Data sources and assumptions

Prologis provided its total square footage by country as of June 30, 2020, and all estimates are as of that date. Prologis also provided an estimate of the average square footage per direct employee by country, which ranged between 1,000 and 1,900 square feet.

Estimates of throughput (the total value of goods transported through Prologis warehouses) were based on expert opinions solicited during the first iteration of this report of approximately \$2 million per thousand square feet in 2016. This estimate was updated to \$2.2 million based on nominal productivity estimates from the Oxford Economics global industry databank for the most recently available year (2019).

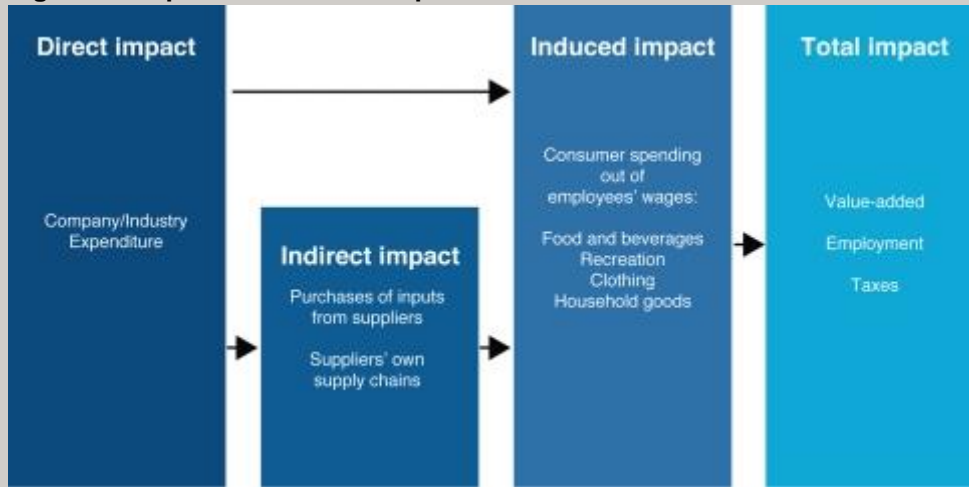
While Prologis portfolio data are current as of June 30, 2020, productivity estimates are generally made using 2019 data, and results are benchmarked to 2019 macroeconomic data, as these are the most recently available published figures. Additionally, this approach avoids complications relating to Covid-19 induced economic effects. The assumptions relating to square footage per warehouse worker were also made prior to Covid-19. Changes to these assumptions were considered, but given the fluidity of the situation, it was decided not to adjust these estimates, especially as Prologis continues to see strong staffing needs from large warehouse users.

Economic impact analysis

A standard economic impact analysis identifies three channels of impact that stem from an activity, from which we can calculate the total economic impact (see Fig. 1). In this case:

- **Direct:** These are the jobs and activity attributable directly to operations in Prologis warehouses
- **Indirect:** These are the employment and value-added contributions that are supported through the supply chain of operations in Prologis warehouses (and in turn, their suppliers).
- **Induced:** This is commonly referred to as the “multiplier effect” and is the economic benefit that results as those employed directly and indirectly spend their incomes in the local community.

Fig. 1. A simplified economic impact model



Economic impact sources and methods

The primary data source for the input-output model used in this work is the OECD Inter-Country Input-Output Tables (OECD IO). We use the most recently available tables, which are for reference year 2015 and in USD. Results are adjusted for inflation and productivity changes to 2019 using country-specific productivity data from the Oxford Economics Global Economics Database. National industry-specific employment data are sourced from the OECD where possible and were estimated using cross-country industry average productivity where these were not available.

For tax impacts, a small share of impacts (product-level taxes and taxes paid directly by producers) are included in the original OECD IO tables. Taxes on labor and capital income are estimated using average national tax rates (as a share of total labor and capital income) sourced from the International Centre for Tax and Development. It's important to note that these tax impacts are high-level estimates based on average tax rates across the economy, rather than precise industry-level modeling.

2. DIRECT RESULTS SUMMARY

2.1 THROUGHPUT

As of June 30, 2020, Prologis operated almost one billion square feet of warehouse space globally on an owned and managed basis.

Based on the assessment of industry experts, Oxford Economics estimated warehouse throughput (the value of goods transported through the warehouse over the course of one year) of approximately \$2.2 million per thousand square feet.¹

Applying this ratio to the Prologis portfolio, we estimate global throughput through Prologis warehouses of approximately \$2.2 trillion globally. This is equivalent to approximately 2.5% of global GDP, or 4.4% of global household consumption.² For countries where data is available, we also estimated throughput as a share of goods consumption (excluding services). Throughput is around 30% of goods consumption in the U.S. and around 11% overall in Europe.³ This ratio of Prologis throughput to national GDP varies among the countries in which Prologis operates from 0.6% in Singapore to 12.5% in the Czech Republic (see Fig. 2).

¹ This estimate was based on the most recently available data from 2019.

² It is important to note that GDP represents the total value of all *final goods and services* production. Some warehouses may be used to store intermediate goods (i.e. components used in the production of final goods), and of course services do not need to be stored, and a single good will often be stored in multiple warehouses on its way to final consumers.

³ OECD tables for final consumption expenditure were used to derive goods consumption, and where 2019 was not yet available, 2018 data were grown proportionally to overall household compensation. The U.S. figure is from the BEA. Data are unavailable for Brazil, China, and Singapore.

Fig. 2. Annual throughput through Prologis warehouses by country as a share of GDP and household consumption

Country	Throughput	GDP (\$ millions)		Household consumption			
				Goods & services		Goods only	
	\$ billions	\$ billions	throughput %	\$ billions	throughput %	\$ billions	throughput %
Belgium	\$7	\$530	1.3%	\$272	2.5%	\$117	5.9%
Brazil	\$24	\$1,839	1.3%	\$1,194	2.0%		
Canada	\$23	\$1,736	1.3%	\$1,004	2.3%	\$424	5.5%
China	\$110	\$14,330	0.8%	\$5,640	2.0%		
Czech Republic	\$31	\$247	12.5%	\$117	26.3%	\$65	47.0%
France	\$71	\$2,709	2.6%	\$1,455	4.9%	\$643	11.0%
Germany	\$57	\$3,853	1.5%	\$2,011	2.8%	\$923	6.2%
Hungary	\$15	\$161	9.4%	\$78	19.4%	\$45	33.7%
Italy	\$28	\$2,001	1.4%	\$1,204	2.3%	\$576	4.8%
Japan	\$98	\$5,084	1.9%	\$2,807	3.5%	\$1,131	8.7%
Mexico	\$91	\$1,260	7.3%	\$824	11.1%	\$478	19.1%
Netherlands	\$53	\$909	5.8%	\$397	13.4%	\$174	30.6%
Poland	\$50	\$592	8.5%	\$339	14.8%	\$207	24.2%
Singapore	\$2	\$372	0.6%	\$134	1.6%		
Slovakia	\$10	\$105	9.5%	\$59	16.9%	\$32	31.0%
Spain	\$29	\$1,394	2.1%	\$803	3.6%	\$344	8.4%
Sweden	\$19	\$532	3.6%	\$235	8.1%	\$110	17.2%
United Kingdom	\$73	\$2,828	2.6%	\$1,775	4.1%	\$723	10.1%
U.S.	\$1,359	\$21,428	6.3%	\$14,563	9.3%	\$4,505	30.2%
Total of these 19	\$2,152	\$61,910	3.5%	\$34,911	6.2%		
Global	\$2,152	\$86,599	2.5%	\$48,833	4.4%		

Source: Prologis and Oxford Economics

2.2 DIRECT EMPLOYMENT

The direct employment at Prologis warehouses represents the total employment by Prologis clients of those working in Prologis warehouses, performing logistics, and light manufacturing functions.

Oxford Economics estimated direct employment of approximately 853,700 in Prologis warehouses globally (see Fig. 3).

Fig. 3. Direct employment in Prologis warehouses

Country	Direct employment	Comparison with 2017 estimates	
		Estimate for 2017 under current sf assumptions	% change
Belgium	3,100		
Brazil	9,500	7,700	23%
Canada	9,100	7,200	26%
China	49,400	13,800	258%
Czech Republic	13,700	10,900	26%
France	31,700	33,700	-6%
Germany	25,600	23,300	10%
Hungary	6,800		
Italy	12,400	10,900	14%
Japan	23,100	14,100	64%
Mexico	35,500	30,400	17%
Netherlands	23,800	17,500	36%
Poland	22,400	24,900	-10%
Singapore	1,000		
Slovakia	4,500		
Spain	12,900	8,200	57%
Sweden	8,500		
United Kingdom	32,500	23,700	37%
U.S.	528,300	313,700	68%
Total / Global	853,700	539,900	58%

Source: Prologis and Oxford Economics

In the case of the United States, we can compare this direct employment figure, 530,300, to total employment in the warehousing and storage sector, 1,145,000, as of 2018, the most recently available year.⁴

2.2.1 Direct employment changes since July 2017

Oxford Economics first estimated the economic impacts of operations in Prologis warehouses in 2017.⁵ Based on estimates available at that time, we assumed that direct employment at Prologis warehouses would be one worker for every 743 square feet (69 square meters) of warehouse space globally. Subsequent research by Prologis has refined this estimate and resulted in the country-specific estimates of 1,000-1,900 square feet per direct employee.

Based on the original assumption, we estimated total direct employment of 816,200 workers in Prologis warehouses in July 2017. Updating the previous assumption,

⁴ Bureau of Economic Analysis (BEA) National Income and Product Accounts (NIPA) table 6.4D.

⁵ See: "The Future Flow of Goods: Economic impact of Or Logistics Real Estate" (August 2017).

however, we would estimate total employment in Prologis warehouses in 2017 of 539,900. The current estimated global direct employment in Prologis warehouses of 853,700, thus represents a 58% increase.

3. TOTAL RESULTS SUMMARY

This section estimates the total economic impacts of activities in Prologis warehouses. As described in the methodology box in chapter 1, these impacts include the direct operations in the Prologis warehouses themselves, the indirect (supply chain) impacts, and the induced impacts.

3.1 TOTAL GDP IMPACTS

The total GDP impacts of Prologis's warehouses in the 19 countries in which Prologis operates are estimated at \$214 billion. The largest impact is in the United States, at \$153 billion, followed by the United Kingdom at \$8 billion, and then France and Germany, each with \$7 billion (see Fig. 4.) Despite having the second highest employment impacts (after the United States), China has only the fifth highest GDP impact owing to lower labor productivity in the OECD macroeconomic data that underlies this modeling.

Fig. 4. Total (direct + indirect + induced) economic impacts of operations in Prologis warehouses

Country	GDP (\$ mil)	Employment	Tax (\$mil)
Belgium	\$1,200	12,300	\$500
Brazil	\$800	53,200	\$200
Canada	\$4,400	42,000	\$1,200
China	\$6,000	334,200	\$2,100
Czech Republic	\$1,400	33,900	\$400
France	\$7,100	82,100	\$2,900
Germany	\$7,200	94,400	\$2,200
Hungary	\$500	15,200	\$200
Italy	\$3,200	42,300	\$1,200
Japan	\$3,900	57,400	\$1,000
Mexico	\$2,900	84,900	\$400
Netherlands	\$6,000	66,000	\$2,000
Poland	\$2,100	58,100	\$500
Singapore	\$600	4,700	\$100
Slovak Republic	\$500	10,800	\$100
Spain	\$2,800	43,300	\$800
Sweden	\$2,400	24,400	\$1,200
United Kingdom	\$7,600	99,900	\$2,200
United States	\$153,200	1,255,200	\$35,800
Total of these 19	\$213,900	2,414,300	\$55,000
Global	\$226,100	2,846,800	*

Source: Prologis and Oxford Economics

The economic impact model that is used to calculate these impacts includes spillovers in other countries besides the nineteen, where Prologis has direct operations. Although the entire direct economic impact takes place in these nineteen countries, there are indirect (supply chain) and induced (spending out of wages) spillovers from this activity in other countries, which the model does capture. **Taking this into account, the full global economic impact of operations in Prologis warehouses is \$226 billion.**

3.2 TOTAL EMPLOYMENT IMPACTS

In the 19 countries in which Prologis owns warehouses, the total employment impact, including direct, indirect, and induced impacts, was 2.4 million. Over half of this impact was in the United States, 1.3 million jobs supported by activities in Prologis warehouses. Following this was China, with 334,000 jobs, and the United Kingdom with approximately 100,000 jobs.

As with the GDP impacts above, it is possible to estimate spillovers in countries other than the 19 where Prologis operates. **The total global employment impacts associated with activities in Prologis' warehouses are estimated at 2.8 million.**

3.3 TOTAL TAX IMPACTS

The total global tax impacts of the \$214 billion in economic activity in the 19 countries in which Prologis operates is estimated at \$55 billion. Unlike the GDP and employment impacts described above, data limitations do not allow us to extend this to a fully global estimate. However, the large majority of tax impacts, like the GDP impacts, are captured in these nineteen countries.

The largest tax impacts are generally in the countries where Prologis' GDP impacts are largest, including the United States (\$36 billion), France (\$3 billion), and the United Kingdom, Germany, China, and the Netherlands (\$2 billion each).

Importantly, as described in the methodology note, the tax estimates presented are high-level estimates and are not comprehensive of all taxes in all countries. Included in these estimates are product-level taxes and taxes paid directly by producers, as well as high-level estimates of taxes paid on corporate and labor income.



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