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Chapter 3
Walls and Fences: A Journey Through History and Economics

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3.1 Introduction

Since the dawn of time, people have moved across land and ocean in search of a better life. When humans first left Africa to settle across the globe, they were motivated by their need for food, space, and resources. Early large-scale migrations were people fleeing wars, famine, and disease. Warriors and settlers from strong empires moved across continents to conquer weaker neighbors. Cross-border economic migration gained momentum in the twentieth century, fueled by rising per capita incomes in poorer countries, booming international business, strengthened personal ties with people in foreign countries, and cost-cutting advances in transportation. Voluntary and peaceful labor mobility has been beneficial for migrants, whose labor is more productive in richer economies; for businesses in search of qualified workers; for the natives of host countries, whose assets gained value; and for migrants' families back home who receive transfers (Constant and Zimmermann 2013; Zimmermann 2014b; Blau and Mackie 2016).

Contribution to The Economic Geography of Cross-Border Migration.

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Table 3.1 Modern Walls and Fences

Builder	Target	Constructed aprox.
Dismantled		
East Germany	West Germany	1960s–1989
Hungary	Austria	1960s–1989
Czechoslovakia	West Germany	1960s–1989
Russia/USSR	Finland	1960s–1992
Russia/USSR	Norway	1960s–1992
Before 1990		
Cuba	US (Guantanamo)	1961
Hong Kong	China	1962
Israel	Syria	1973
Cyprus	Cyprus Northern	1974
South Africa	Mozambique	1975
Israel	Lebanon	1976
North Korea	South Korea	1977
Thailand	Malaysia	1978
Morocco	Western Sahara	1980
South Africa	Zimbabwe	1984
India	Pakistan	1988
Between 1990 and 2001		
United States	Mexico	1993
India	Bangladesh	1994
Israel	Gaza	1994
Kuwait	Iraq	1994
Uzbekistan	Afghanistan	1994
Spain	Morocco-Ceuta	1995
Spain	Morocco-Melilla	1998
Uzbekistan	Kyrgyzstan	1999
Turkmenistan	Uzbekistan	2001
Between 2002 and 2010		
Israel	West Bank	2002
Botswana	Zimbabwe	2003
Iran	Afghanistan	2003
Saudi Arabia	Yemen	2003
India	Myanmar	2004
Lithuania	Belarus	2004
Brunei	Malaysia	2005
Arab Emirates	Oman	2005

(continued)

Table 3.1 (continued)

Builder	Target	Constructed aprox.
Arab Emirates	Saudi Arabia	2005
Kazakhstan	Uzbekistan	2006
Saudi Arabia	Iraq	2006
Iran	Iraq	2007
Iran	Pakistan	2007
Jordan	Iraq	2008
Jordan	Syria	2008
Russia	Georgia	2008
Egypt	Gaza	2009
Myanmar	Bangladesh	2009
Israel	Egypt	2010
Kazakhstan	Kyrgyzstan	2010
Between 2011 and 2018		
China	North Korea	2011
Greece	Turkey	2012
Bulgaria	Turkey	2013
Algeria	Morocco	2014
Oman	Yemen	2014
Turkey	Syria	2014
Turkmenistan	Afghanistan	2014
Austria	Slovenia	2015
Azerbaijan	Armenia	2015
Hungary	Croatia	2015
Hungary	Serbia	2015
Kyrgyzstan	Kazakhstan	2015
Kyrgyzstan	Uzbekistan	2015
Latvia	Russia	2015
Macedonia	Greece	2015
Morocco	Algeria	2015
Slovenia	Croatia	2015
Ukraine	Russia	2015
UK	France	2015
Israel	Jordan	2016
Norway	Russia	2016
Tunisia	Libya	2016
Estonia	Russia	2017
Lithuania	Russia	2017

(continued)

Table 3.1 (continued)

Builder	Target	Constructed aprox.
Pakistan	Afghanistan	2017
Turkey	Iran	2017
Iraq	Syria	2018
Planned		
Algeria	Libya	
Hungary	Romania	
India	Bhutan	
Latvia	Belarus	
Malaysia	Brunei	
Malaysia	Indonesia	
Poland	Belarus	
Poland	Ukraine	
Russia	Ukraine	
Turkey	Iraq	

Foreign-born people now account for 28% of the total population of Australia, 23% of Israel, 20% of Canada, 13% of the US, 13% of Germany, and 12% of the UK.[1] Yet even at its highest level ever, international migration is surprisingly uncommon: only about 3% of the world population lives outside of their country of birth.[2] In the last decade, regional conflicts in the Middle East, rising inequality and poverty in Africa, violence in South America, and natural disasters in various parts of the world have sent a flow of refugees to Europe and the US. Between 2015 and 17, over 1.5 million refugees arrived to Europe by sea.[3] This is a small fraction of 21.5 million people displaced by climate-related catastrophes between 2008 and 2015 Miller 2017).

Gallup estimates that 14% of world adults, 710 million people, would migrate permanently if they could, and even more would move temporarily.[4] More than 40% of respondents from very poor countries and countries with armed conflicts are potential migrants. In Africa alone, working age population is projected to rise by about 1 billion in 2055, increasing the pressure at the gates to Europe and China, two areas where population is predicted to decline substantially (Bruni 2019). The flow of refugees is likely to continue. According to the World Bank, water scarcity, crop failure, and rising sea levels will displace as many as 143 million people in Sub-Saharan Africa, South Asia, and Latin America by 2050 (Rigaud et al. 2018).

[1]The Organization for Economic Cooperation and Development https://data.oecd.org/migration/foreign-born-population.htm.

[2]United Nations Population Fund http://www.unfpa.org/migration.

[3]The UN Refugee Agency https://data2.unhcr.org/en/situations/mediterranean.

[4]http://news.gallup.com/poll/211883/number-potential-migrants-worldwide-tops-700-million.aspx.

Faced with unprecedented inflows of immigrants, developed countries have a choice of policies to allow or restrict migration. Governments of richer nations have responded by erecting walls and fences, investing in border protection, and adopting policies to restrict undocumented migration.

In this chapter, we examine the global phenomenon of building walls, fences, and other man-made physical barriers between nations. We offer a historical perspective on why border barriers existed in the past, and how the rationale for building walls has changed. We discuss the costs and benefits of walls and fences, and review literature on alternative policies, including the open border policy. Section 3.2 surveys the history of walls and fences. Section 3.3 discusses their rationale. Section 3.4 deals with the economics of open borders. And Sect. 3.5 concludes.

3.2 A History of Walls and Fences

3.2.1 Ancient and Medieval Walls

Humans on all continents have been building walls for millennia. The main motive for their early construction was to defend city-states against armies of unwelcome nomadic neighbors. A large physical obstacle also served as a signal of political power, wealth, and strength, intended to deter future threats, a claim to land, and a way to define who belonged inside and who stayed out. The scale of walls has differed greatly throughout history, ranging from simple barriers between cities to massive fortifications between kingdoms.

One of the oldest known city, Jericho in modern-day Palestine, was walled as early as 8000 BC (Encyclopedia Britannica 2019). The 600-meter long stone wall was built and improved over several hundred years. The wall had a tower and a long ditch, and was likely intended as protection against floods and raiders. The construction project required enormous amount of physical labor—excavating the ditch, cutting through solid rock for materials, and hauling the stone to assemble the wall itself. Economists today may wonder how our ancestors planned, organized, and managed such a sophisticated project with so little training in engineering. This was a time when humans were barely transitioning from hunters to farmers, did not yet use domesticated animals, and would not invent metal tools or the wheel for thousands of years. It is not clear what kind of manpower was used—communal labor, hired workers, or early slaves—or what type of surplus of an essential tradable resource the population of Jericho produced through mining or agricultural production to generate enough wealth to finance the wall.

As ancient cities grew all over the world, so did the walls. In 3000 BC, a 9 km wall surrounded the largest city in the world: the Sumerian city of Uruk in modern Iraq, with a population of 80,000 residents (Dumper and Stanley 2007). Around 2030 BC, ancient Sumerians constructed a massive 160 km fortified barrier across its territory to keep out the Amorite nomadic tribes. It succeeded in fending off enemies for a

few years, until the invaders either broke through the wall or simply walked around it to destroy Sumerian cities (Spring 2015).

Ancient Greeks built a number of walls, including the siege-proof long walls of Athens around 460 BC. The fortifications, extending from the city to its harbor, protected Athens during one war with Sparta, but the city surrendered after its navy was defeated at sea (Conwell 2008).

Around 83–260 AD, the Roman Empire reinforced its borders with a variety of wall and ditch structures made of turf and stone, known as limes. Limes were intended to keep barbarian tribes out of the Roman Empire, and were also used as customs checkpoints for the movement of goods and people. Among the best known limes are the 118 km Hadrian's Wall, and the 60 km Antonine Wall in Scotland, a 750 km wall in North Africa, and 568 km Limes Germanicus in Germany. The Roman Empire invested heavily in its military, and for a while its military conquests supplied a steady supply of slave labor to service the walls. Over time, expansion slowed down, and pressure from neighboring barbarians increased. Overspending on the military and walls led to a financial crisis and a host of negative effects—oppressive taxation and inflation, widespread tax evasion, and a widening gap between the rich and the poor, foreshadowing its eventual collapse. Roman Limes made for a good defense from disorganized robbers from Britain to the Arabian Peninsula, yet they did not protect the empire against the better-organized barbarian armies of Vandals, Alans, and Goths (Jones 1964).

Around 460–512 AD, the Byzantines built the 56 km Anastasian Wall near Constantinople, a stone and turf system of fortifications with towers, forts, and ditches. For over a century it helped protect the empire from invasions from the west, but two hundred years later, the wall was no longer manned due to decreased threats and the high cost of troops (Williams and Friell 1998).

In 430–570 AD, the Sasanid Empire, located in modern-day Iran, invested in several large-scale public defense projects to fortify its borders in response to territorial disputes with nomadic neighbors. The most impressive part of the project was the 200 km Gorgan Wall, the world's largest defensive structure at the time and a masterpiece of ancient engineering, made out of uniformly shaped mud bricks, featuring 38 forts, a well-engineered network of canals that acted as both a water supply system and a defensive moat, and a garrison of at least 20,000 troops. This effective border defense system is thought to have contributed to the empire's longevity for the next 200 years, but later it was abandoned as the empire's prosperity came to an end and its maintenance became unaffordable (Chaichian 2013).

Between 430–800 AD, Anglo-Saxon kings built and maintained Offa's Dyke, a 240 km long ditch and piled soil structure. It was intended to demarcate the border between England and Wales, as well as defend against invaders. The Danish kings built and reinforced Danevirke, a 30 km long defensive structure between 650 and 968 AD. It was last fortified before 1180, and then abandoned 150 years later (Pulsiano and Wolf 1993).

Construction of the Great Wall of China began before 220 BC and continued until the seventeenth century, the total distance reaching 21,196 km. Its original purpose was to separate the civilized Chinese farming heartland from nomadic barbarians to

the north, and to claim the disputed territory.[5] Over time the wall became a tool to control trade, prevent smuggling, and serve as entry portal with customs checkpoint. Millions of conscripted peasants lost lives building the wall in harsh climate on steep hillsides due to inadequate transportation, inhumane living conditions, and insufficient food. The total annual expenditure on the wall in 1576 was estimated to cost three-quarters of the annual emperor's budget. Maintaining and garrisoning the wall was financed by higher taxes and revenues from government monopolies on selling salt and iron, at the expense of other social projects (Lovell 2006). Early unconnected fortifications were not real obstacles against nomads. In later centuries, the wall did provide some protection, but not against the organized army of Genghis Khan in the thirteenth century. The wall did not protect against nineteenth- and twentieth-century barbarians arriving by sea: Europeans, Americans, and Japanese (Waldron 1989; Lovell 2006; Jones 2016). Throughout Chinese history, weaker emperors made investment into the expensive wall as a policy of last resort when all other options—diplomacy, bribery, trade, tribute, or punitive military expeditions—had failed. In contrast, expansionist dynasties—Tang and early Ming—refused to repair the "wall of shame" of their military superiority (Langerbein 2009). The wall did not prevent trade and cultural exchange: steppe nomads came to the early wall to trade horses and leather for pottery and clothing; Chinese rulers learned nomad's fighting techniques and integrated nomads as leaders of their own armies. Even though the protective function of the imperial wall was long obsolete in the twentieth century, the government of communist China kept investing into the wall as it became a symbol of national identity, a monument to the military superiority of China, a poetic inspiration, and a lucrative tourist attraction.

Virtually all cities in Northern China had defensive walls from as early as 2000 BC. Larger cities with more economic activity had longer walls; frontier cities subject to a higher probability of attack had stronger walls. The protective function of the walls may have contributed to a perceived sense of security and attracted more people and commerce to the walled cities: even today these cities have larger population and employment densities (Ioannides and Zhang 2017; Du and Zhang 2018).

In Nigeria, a number of fortifications were built over several centuries from around year 800. Benin city was possibly the largest urban planning project in the world at the time, a web of walls with a total length of 16,000 km that enclosed an entire kingdom made of hundreds of interlocked cities and villages (The Guardian 2016). Benin walls were destroyed by the Europeans in 1897. The other massive wall in the area, Sungbo Eredo, was a 160 km wall and ditch earthworks financed by a rich queen around year 1000, intended for defense, unification, and as a shrine for spirit worshiping (Onishi 1999).

In Mexico, a small Mayan city of Tulum was surrounded on three sides by a 740 m long wall around the year 1200, for defense against larger city-states (Bley 2011). In 1281, Japan built a 20 km stonewall Genko Borui against Mongol invasion, and it is said to have contributed to the defeat of the invaders (Vallet 2016).

[5]Climate change has been identified as a major source of the nomadic invasions against the agriculturalists in mid-to-late imperial China (Pei et al. 2018).

Between 1500 and 1800, the Russian empire fortified its southern borders with barricades of felled trees with ditches and earth mounds, palisades, watchtowers and forts, moving the barriers south as the empire expanded. These fortifications protected against Tatars and other nomads who were active participants in the slave market, kidnapping thousands of Eurasians per year and selling them into slavery to the Ottoman Empire. They also prevented domestic runaway serfs from fleeing, and demarcated new land for peasant farmers (Kollmann 2017).

Plagued with chronic raids and territorial disputes, settled agricultural tribes sought to protect themselves against outside threats to survival by asserting control over land and strategic routes. Walls were expensive to build and even costlier to maintain. Early construction materials—wood and mud bricks—would be eroded by weather, leveled by earthquakes, or ruined by invaders. Despite costing much in resources, wealth, and manpower, ancient walls were only partially successful in achieving their intended goals. These defenses appeared to have worked for the lifetimes of their builders, sometimes for several subsequent generations, but ultimately lost their value (Spring 2015). It is unclear whether the gain of security provided by walls was worth the opportunity cost of their construction, whether the damage inflicted by barbarians could outweigh the financial burden of the projects.

It is tempting to speculate how building a wall relates to the lifecycle of a city-state or an empire. Do expanding, flourishing, or declining powers build defensive barriers? In premodern history, the pattern suggests that richer rulers whose power was on the decline were more eager to build a physical defense system. Excessive spending on the walls may have in turn weakened empires and expedited their collapse.

3.2.2 Modern Walls

Between the late medieval times and early twentieth century, empires rose and fell, national borders moved numerous times, finally settling on what later became political borders of modern nations. This period in history is characterized by declining violence in Europe: rates of homicide from violence and wars in European countries decreased 10–50 times during that time (Pinker 2011). Pinker (2011) attributes the trend to the spread of the power of centralized authority with monopoly on the legitimacy of violence, adoption of law and order, the advent of diplomacy, development of trade partnerships, advances in transportation, the rise of literacy, increased life expectancy, adoption of the values of tolerance and human rights, aversion to violence and cruelty. Recognition of sovereignty over a territory among states became more common after the 1600s, in part due to advances in cartography that allowed better records of borderlines (Jones 2016). Consequently, the need for defense walls declined and fewer new defense barriers were built during that time.

While the construction of physical barriers was on the decline, new legal border barriers emerged. Their purpose was no longer defense, but rather control over the movements of civilians. Early steps toward a modern passport system

appeared in fourteenth-century England, sixteenth-century Germany, seventeenth-century France, and eighteenth-century Russia with the introduction of migration permits (Torpey 2000). Throughout fourteenth- to eighteenth-century population growth in Europe was slow, people were seen as wealth and a valuable asset for extraction of military service, taxes, and labor, thus governments sought to restrict outbound migration. At various times European monarchies introduced restrictions on emigration of skilled labor, such as artisans (1534, England), shipbuilders, sailors, and fishermen (1669, France). Prussia restricted all emigration without permission in 1686. China had severe punishments, even death, for anyone going abroad in the sixteenth to eighteenth century (Xu 2005). The majority of European settlers who colonized the United States were "illegal" migrants who bypassed emigration restrictions. Spain, Russia, England, Holland, and the Ottoman Empire, among other countries, welcomed immigrants and refugees with tax breaks and other incentives (Dowty 1987).

Most Western countries adopted passports and visas after WWl. Travel documents, ID cards, registration, and censuses, were early forms of state surveillance and control over citizens' identities and their whereabouts. By allowing or depriving people of the freedom to move, states could efficiently conduct law enforcement, prevent potential anti-government insurgencies, target national security operations, distribute incentives and punishments, prevent brain drain, administer claims to assets, supervise population growth and composition (Torpey 2000).

Leading up to WWll, Europe experienced a revival of defense fortifications. Finland constructed two lines of fortified defense on the Soviet border in 1920–1940, the Mannerheim Line with fallen trees and boulders, and the Salpa Line with 350,000 stones weighing 3 tons each. Czechoslovakia 1935–38 built border fortifications with infantry blockhouses and anti-tank obstacles. Greece built the 155 km long Metaxas Line of 21 independent fortification complexes to protect from Bulgarian invasion in 1936–41. France 1929–38 constructed the Maginot Line, a 380 km long permanent system of fortifications with concrete bunkers, tunnels, tank obstacles, artillery casemates, machine gun posts along the German and Italian borders. Sweden built the 500 km Skåne Line on its borders with barbed wire and concrete bunkers along the shore, armed with machine guns and cannons. Mussolini's Italy 1930–42 built the Alpine Wall, a system of defensive fortifications along the 1851 km of its northern frontier facing France, Switzerland, Austria, and Yugoslavia. Nazi Germany built the Atlantic Wall equipped with coastal guns, batteries, mortars, artillery, and thousands of stationed troops along the coast of continental Europe and Scandinavia in 1942–44 against an anticipated Allied invasion from the United Kingdom (Kaufmann and Donnell 2004). None of these wartime fortifications could stop attacks by air, and some did not even deter the enemy armies arriving by land and sea. When the Allies eventually invaded the Normandy beaches, most of the Atlantic Wall defenses were stormed within hours. In the case of the Maginot Line, Nazis avoided it while invading France using an alternative route through Belgium.

After WWII, the United Nations was formed and countries recognized each other's political borders and territorial integrity. The triumph of diplomacy and peaceful

coexistence could render the border walls and fences obsolete. However regional conflicts persisted, and security walls were a frequent solution.

France built an electric fence with minefields, the Morice Line, before the Algerian War of 1957, to prevent the rebel guerrillas from entering Algeria from Tunisia and Morocco. Israel built a 150 km defense system known as the Bar Lev Line, a massive sand wall supported by a concrete wall, along Suez Canal during the 1967 Six-Day War with Egypt, Jordan, and Syria. Guantanamo/Cuba, and China/Hong Kong fortified their mutual borders with 30 km walls in the early 1960s. Oman built a 50 km mined Hornbeam line against guerrilla insurgents in 1973 (Peterson 2008). Cyprus was divided by a UN buffer zone after Turkey took over Northern Cyprus in 1974, and Northern Cyprus built a 300 km concrete wall. Morocco built a 2,700 km sand "berm" with trenches, barbed wire, and landmines against Western Sahara in 1987 to claim disputed territory. North and South Korea built a 243 km heavily fortified demilitarized zone in the late 1970s.

During the Cold War of 1945–91, the Soviet Union and its allies put up the "iron curtain", a set of self-imposed physical, legal, and informational barriers between themselves and the West intended to prevent trade with the West and to stop emigration of citizens to the West, in order to protect the emerging fragile new communist society based on work, cooperation, and egalitarianism from western capitalism based on individualism, competition, and hierarchy. It also included militarized borders with the West: a 240 km electric fence between Hungary and Austria, and the Berlin Wall.

Berlin Wall, built by East Germany in 1961, was a complex 150 km long system with sensors, a fence, barbed wire obstacles, dog-runs, an anti-tank ditch and obstacles, an access road for guards and vehicles, an alley of lights, 186 guard towers, a control strip of raked sand, followed by the main exterior wall with 25 border crossings. The wall employed 12,000 elite patrol soldiers and 1,000 dogs; troops were equipped with 567 armored personnel carriers, 156 heavy engineering vehicles, 2,295 other vehicles, 48 anti-tank guns, 48 grenade launchers, and 114 flame throwers. Despite the high-tech engineering of the wall, tens of thousands of East Berliners managed to escape by climbing over the wall, digging under, and hiding in secret compartment of cars; 75,000 people received prison sentences for attempting to flee, and 140 lost lives. Operating much like a prison wall, the Berlin Wall blocked emigration of skilled labor without which East Germany would arguably not be able to survive. It extended the life of the regime by at most 28 years till 1989, and when it finally proved to be an economic failure, the wall collapsed along with the ideology that supported it (Rottman 2012).

Fences erected by communist regimes were the only physical barriers in history intended to restrict out-migration. At least 5 were demolished at the end of the Cold War (Berlin Wall, Hungary–Austria, Czechoslovakia–West Germany, USSR-Finland, USSR-Norway), only the barrier between the Koreas remained. In contrast, the rest of the world was about to see a wave of walls against inbound migrants.

South Africa put up a lethal electrified fence on its border with poorer neighbors Mozambique and Zimbabwe in 1986. The fence was responsible for hundreds of refugee deaths in the first 3 years of its existence as migrants who tried to cross the

fence got electrocuted, while those who tried to bypass the fence by going through a national park got eaten by lions. Yet most illegal migrants managed to cross the fence (New Scientist 1990).

The decade of 1990s was marked by giant strides of the developed world toward unification, as evidenced by the adoption of NAFTA and common borders in the EU. But it was also the decade of fast population growth and rising inequality, the emergence of new regional conflicts, and the expansion of trade in drugs, weapons, and human trafficking.

Between 1990 and 2001, six security walls were built against potential terrorists (here and elsewhere the first country is the builder): Israel/Gaza, Kuwait/Iraq, India/Bangladesh, Uzbekistan/Afghanistan, Uzbekistan/Kyrgyzstan, Turkmenistan/Uzbekistan. In addition, two countries built migration walls: US/Mexico, and the Spanish enclaves of Ceuta and Melilla in Morocco. Smuggling of drugs, weapons, and other controlled goods were secondary reasons for several of these fences. Although not explicitly stated, claims to land may be additional reasons to erect walls in case of Israel, India, and Central Asian countries, given their history of territorial disputes.

3.2.3 Twenty-First-Century Walls

Concerns over terrorism magnified after the terrorist attacks of 9-11-2001 in the US. Other countries including Israel, UK, Spain, Indonesia, Russia, Bangladesh, Pakistan, and India, were also attacked by terrorist organizations. Between 2002 and 2010, fifteen new security walls and fences were added to the map around Middle East, when ISIS insurgency began to threaten stability in the region. Israel built security fences separating it from the West Bank and Egypt. Egypt built an over-and under-ground wall with Gaza. Saudi Arabia built an 885 km security wall with Iraq and fences with UAE, Oman, Qatar, Jordan, and Yemen. UAE erected fences along its borders with Saudi Arabia and Oman (migration, smuggling, security). Jordan built walls with Syria and Iraq. Iran walled off Iraq, Afghanistan, and Pakistan (security, smuggling). Israel Defense Forces claim that the Israeli-Egypt fence was effective in reducing the flow of illegal migrants from Africa.[6]

Outside Middle East, eight new fences were constructed: between Brunei/Malaysia (smuggling, migration), Myanmar/Bangladesh (security), Lithuania/Belarus (smuggling), Kazakhstan/Uzbekistan (smuggling), and Kazakhstan/Kyrgyzstan (smuggling). Russia built a barbed wire barricade on the border with Georgia (conflict). In Africa, Botswana put up a fence against Zimbabwe in response to a flood of refugee migrants who were accused of taking jobs, committing crimes, and spreading HIV (Kopinski and Polus 2019).

[6]Financial Times https://www.ft.com/content/ccf4b532-3935-11e6-9a05-82a9b15a8ee7.

In response to massive migration of Middle Eastern and North African refugees to the EU between 2011 and 2018, seven migration fences went up in Europe. Macedonia built a fence with Greece. Greece and Bulgaria have erected barbed wire fences on the border with Turkey. Hungary built a 175 km fence on the border with Serbia and a 350 km fence on the border with Croatia. Slovakia put a fence with Croatia, Austria with Slovenia. The UK financed a 13-foot-high barrier in the French port city of Calais, aimed at preventing refugees and migrants from entering Britain.

Middle East and North Africa added nine more security fences, fully or partially built: Oman/Yemen, Turkmenistan/Afghanistan, Pakistan/Afghanistan. Turkey/Syria, Turkey/Iran, Israel/Jordan, Israel/Syria, Israel/Lebanon, Tunisia/Libya, and Algeria/Morocco.

Regional conflicts and land disputes resulted in seven additional fences in Eastern Europe and Asia: Azerbaijan/Armenia, Ukraine/Russia, Estonia, Latvia, Lithuania built barriers with the Russian territory of Kaliningrad, Kyrgyzstan/Kazakhstan, Kyrgyzstan/Uzbekistan, and China/North Korea.

Several countries have announced future construction of fences: Estonia/Russia, Latvia/Belarus, Poland/Belarus, Poland/Ukraine, Hungary/Romania, Turkey/Iraq, India/Bhutan, Malaysia/Brunei, Malaysia/Indonesia, Russia (Crimea)/Ukraine, and Algeria/Libya. These appear to be mostly motivated by smuggling, territorial claim, and animal disease control. Latin America is free of border barriers except for those erected by the US between Guantanamo and Cuba.

In addition to border walls between countries, there are separation walls within countries intended to reduce violence. One example is a wall in Baghdad built in 2007 by the US to separate a Sunni district. Another example is a series of forty "peace walls" in Belfast, Northern Ireland, constructed in the 1970s to separate Catholic and Protestant communities.

Modern borders differ greatly in their level of complexity and enforcement. Among the most serious borders is Kuwait/Iraq, made of electrified fencing and razor wire, braced by a 4.6 m-wide and 4.6 m-deep trench, complete with a 3.0 m-high dirt berm, and guarded by hundreds of soldiers, several patrol boats, and helicopters. Saudi Arabia/Iraq wall is equipped with ultraviolet night-vision cameras, buried sensor cables, thousands of miles of barbed wire, 50 radars, 78 monitoring towers, eight command centers, ten mobile surveillance vehicles, 38 night-vision camera-equipped gates, 32 rapid-response centers, and three rapid intervention squads, all linked by a fiber-optic communications network. Some of the equipment used at the borders can detect a person 19 km away and a vehicle at 39 km.[7] Among relatively porous borders are fences between Malaysia/Thailand, and India/Bangladesh. Both are lightly patrolled and monitored, and thus not effective deterrents for migrants and smugglers who often use fake documents and bribes to cross between the two countries.

We estimate that at least 67 international borders are fortified to various degrees with man-made barriers as of 2018, and there are plans to build 10 more in the next

[7]Gulf News Jan 22, 2015 http://gulfnews.com/news/gulf/saudi-arabia/saudi-arabia-building-hi-tech-border-fence-1.1445112.

few years.These borders are precisely documented in the Appendix Table: Modern Walls and Fences and illustrated in Fig. 3.1: Border Walls and Fences 1970–2020.

3.2.4 US-Mexican Wall

The US–Mexico wall is an example of a border barrier with several official motives behind it: stop illegal migration, fight drug and human smuggling, and prevent drug-related violence (Andreas 2000; Dear 2013). The first piece of the wall, the 22 km San Diego fence, was built in 1990–93. Since 2006, a total of 1,000 km of steel and concrete were added in various parts of this 3,200 km border. About one-third of the border consists of natural barriers such as desert stretches and the Rio Grande. In between the walls, there is "virtual fencing" composed of sensors, surveillance cameras, and other detection technology. Since 9/11, the US side of the border has been further militarized, and the border patrol budget increased 20 times. There are plans to add another 1,000 km of the wall in the near future with the total cost up to $25 billion, including labor but not including the cost of land acquisition from current owners. Once constructed, the government will need to invest a few billion a year in wall maintenance, repairs, guards, and support infrastructure (Economist 2016, Fig. 3.1, Table 3.1).

The number of undocumented immigrants in the US increased between 1986 and 2008 from about 3–12 million people, or 7% of the US population. In the 1960s, 70 million Mexicans crossed the border, but 85% returned home. Increased border enforcement made circular migration more costly and risky, forcing undocumented Mexican migrants to settle permanently in the US (Zimmermann 2014a, b, 2017a, b; Massey et al. 2016).

The US-Mexican wall does not deter drug smuggling. Most illicit drugs are delivered into the US in vehicles with secret compartments and difficult to inspect shipping cargo using legal checkpoints. Drugs are also conveyed through elaborate systems of tunnels under the wall. Between 1990 and 2016, 224 tunnels were discovered, some with air vents, rails, and electric lights (US DEA 2016).

Stricter border enforcement in the US raised the cost of human smuggling by pushing it farther into the desert into the hands of large drug cartels. Coyotes used to work independently or in small groups. Now they work for one of the four narco cartels, paying the cartels a huge cut of the profits. If migrants try to cross the border without paying, they risk getting beaten or murdered. The average price is upward of $4,000 in 2017 dollars (US DHS 2017). Smugglers are more often armed and violent, and conflicts between them and border enforcement agents resemble a war. Migrants are sometimes left to die in the desert: there have been 4,500 migrant deaths along the U.S.–Mexico border between 2006 and 2017 (US Customs and Border Protection 2017).

Similar dynamics are observed in Europe. The Greek fence has forced migrants to pursue more dangerous and expensive alternative routes. Trips on the Eastern Mediterranean route from Turkey's Western Coast to Greece now cost over €1,000

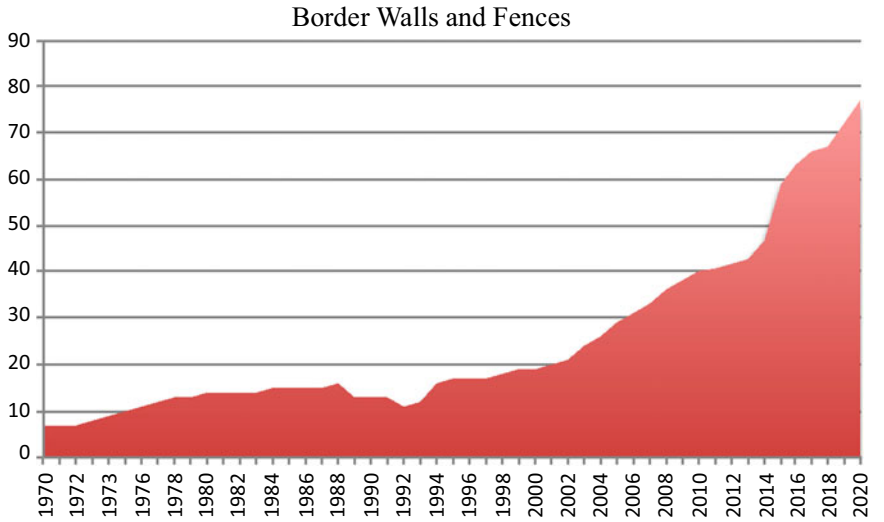

Fig. 3.1 Border Walls and Fences 1970–2020. *Note* The graph presents the authors' count of all walls and fences in the world, including partially constructed (Estonia–Russia fence) and planned through 2020. Our estimates are overall similar to those in Vallet (2016), Jones (2016), and Carter and Poast (2017), although our estimates are more conservative. Vallet, Barry, and Guillarmou (quoted in Jones 2016) suggest an estimate of 69 fences in 2016 while our count is 63. We include only walls and fences on international borders (this excludes the Wall of Baghdad, the Walls of Peace in Belfast, and the Great Wall of China), the existence of which we could verify. For example, we are not sure if there is a fence on the border of Russia with China, Mongolia, and North Korea. There is probably at least partial fencing, but in the absence of information we did not count them. As construction start dates differ between sources, we used the most commonly reported dates. The Appendix Table lists all walls and fences included in our calculations. Rosière and Jones (2012) estimate that by 2012 more than 13% of the world's borders were marked with a barrier of some kind

(Stamouli 2016). Between 2014 and 2017, over 11,000 migrants died or went missing in the Mediterranean at sea.[8]

The number of people detained without papers on the US–Mexico border has dropped markedly in 2017 to the lowest number since 2000 (US Department of Homeland Security 2017). Illegal immigration is on the decline because of demographics: Mexico's birth rate has plummeted during the last 40 years from 6.1 children per woman in 1975 to 2.2 in 2005, which is not very different from 1.8 births per women in the US.[9]

[8]Migration Data Portal https://migrationdataportal.org.

[9]World Bank Open Data https://data.worldbank.org.

3.3 Making Sense Out of Walls

Consider the construction of a border barrier from a costs-and-benefits perspective. Costs include electric lighting, roads, security equipment, and guards. A physical wall requires masonry foundations, steel, and concrete, which is relatively expensive, while barbed wire fences are cheaper. Resources spent on walls and border enforcement come with opportunity costs—they could have been directed to alternative uses, such as building better schools and improving cities.

Should a security wall be built to prevent the infiltration of terrorists? Terrorism is costly for an economy as it leads to loss of life and destabilizes investment in productive assets. For example, terrorist attacks committed by the Somalian terrorist group Al Shabaab have had a large negative impact on Kenya's economy in recent years.[10] A security fence may be justified in this case, even though Kenya does not have one. The costs of a security fence can be weighed against the benefits of preventing an attack for a country that faces threats from terrorism. One should keep in mind that historically, walls have not been effective against military attacks (Jones 2016). In recent times, most terrorist attacks in the US and Europe have been committed by legal residents "from within." The strongest walls could not have stopped 9/11. Planes and missiles can fly over walls, tanks can smash them, and biological weapons, drones, and cyberattacks bypass walls entirely. The security effectiveness of borders does not depend on military spending, but rather is a function of institutional design that encourages local cross-border collaborative policing (Gavrilis 2008).

Should a wall be built to prevent smuggling of illicit drugs and weapons? There is little evidence that walls are effective in the war on drugs. Even if they are, the cost of such barriers should be weighed against the results they achieve, given other law and policy options to regulate drugs and guns.

The main driving factor of undocumented migration—and therefore of walls—is inequality. Richer countries build walls against poor neighbors. Jones (2012) estimates that the average GDP of a country that built a barrier, from 2000 to 2011, was 5 times larger than the GDP of the target country. Similarly, Carter and Poast (2017) find statistical evidence that economic disparities have a significant impact on the presence of a physical wall using data on barriers constructed from 1800 to 2014. Therefore addressing the problem of poverty and inequality in the developing world is often suggested to be a way to reduce migration. However, this is only valid in the very long run.[11]

Should a wall be built against illegal immigrants? The benefit of a migration wall may be high if uncontrolled migration imposes large costs on a society and if a wall provides sufficient protection against such inflows. For example, immigrants

[10]The Conversation https://theconversation.com/why-al-shabaab-targets-kenya-and-what-the-country-can-do-about-it-87371.

[11]Economic development and emigration from developing countries are found to be inverse U-shaped. Hence, rising income increases the possibilities for migration, but migration has also a positive impact on development back home. See for a review of the rich literature Clemens (2014) and specific articles like de Haas (2010), Zimmermann (2017a, b), and Dao et al. (2018).

may commit crime, drain welfare resources, threaten national unity, and impose hardship on domestic workers. The cost-effectiveness of building a wall should also be compared to the alternative options of regulating migrant's privileges with policies.

Certain groups and industries—potential voters who influence policymaking—benefit from the proliferation of walls and militarization of borders. For example, the growth in border barriers created a multi-billion-dollar security business for private armament and defense companies specializing in communications, surveillance, information technology, and biometrics. Between 2002 and 2017, exports of Israeli companies specializing in high-tech border security increased 22% each year. Major international companies that have a large share in this market are American *Boeing*, Israeli *Elbit Systems*, Israeli *Magal Security Systems*, Spanish *Amper*, European *EADS Group* (Saddiki 2017). Among other likely beneficiaries will be Cemex, a Mexican firm with around half the quarries close to the border, given that it is not economically feasible to transport cement across great distances. Then, there are companies like the US Golden State Fence Company, a firm that built a significant portion of the border wall in Southern California, and was charged millions of dollars in fines for having hundreds of undocumented workers on its payroll.[12] The list of groups that stand to benefit from the wall also includes the Department of Homeland Security that employs 240,000 people and has an annual budget of $61 billion, including border enforcement, militarized police units, ammunition, detention centers, biometric IDs, and surveillance (Miller 2017).

All types of border barriers reduce well-being of the population by restricting gains from cooperation, specialization, and trade between neighbors. Allen et al. (2018) show that the US–Mexico border wall expansion between 2007 and 10 harmed Mexican workers and high-skilled U.S. workers, but benefited U.S. low-skilled workers, who achieved gains equivalent to an increase in per capita income of $0.36. In contrast, a hypothetical policy of openness, which reduced trade costs between the United States and Mexico by 25%, would have resulted in both greater declines in Mexico to United States migration and substantial welfare gains for all workers.

The noneconomic costs of walls include isolation, broken cultural ties, mistrust that can breed terrorism, damaged farmlands, and a threat to wildlife (Trouwborst et al. 2016). Political scientist Brown (2010) writes the following about Israeli and US–Mexico walls in the book "Walled States": "Both intensify the criminality and violence they purport to repel, and hence, both generate the need for more fortifications and policing. Yet both are heralded for producing peace, order, and security. Both confound barricades and borders, and both articulate a border on confiscated lands. Both walled democracies are justified as state necessity in protecting the people, both draw upon the xenophobia they also exacerbate and project, both suspend the law in the name of blockading outlaws and criminals, and both build a 'suspended political solution' in concrete and barbed wire".

Popular justifications for restricting migration are not based on real evidence, but rather the examples of signaling behavior by governments. In the words of Jagdish

[12]New York Times http://www.nytimes.com/2006/12/15/us/15hiring.html.

Bhagwati who spoke of the India–Bangladesh fence construction in the 1980s, for a politician, building a fence is "the least disruptive way of doing nothing while appearing to do something." (quoted in Di Cintio 2013).

3.4 Open or Closed Borders?

There is a lively debate in the economic literature around the potential consequences of allowing more migration. Kennan (2013, 2014) and Clemens (2011) argue that lifting the restrictions on immigration could produce large efficiency gains because the unskilled workers become more productive when they move from a low wage to a high wage country. As a result, incomes in less-developed countries could more than double and the world GDP would increase by 67–147%.

A large body of research has documented that increased cross-border labor mobility has beneficial effects for host countries and their residents. For example, the EU labor market has become more flexible and better able to absorb shocks after the EU eastern enlargement (Kahanec and Zimmermann 2009a, 2016; Jauer et al. 2019) and this is attributed not only to migrants from the (new) member states but also to third-country nationals.

There is evidence that immigrants do not take jobs away or depress wages. Instead migrants help create jobs for natives, because their skills are most often complements rather than substitutes for the skills of native workers in the production of goods and services (Constant 2014; Peri 2014; Foged and Peri 2016). High-tech startups and established firms owned by foreign-born entrepreneurs have introduced more innovations than firms owned by US-born entrepreneurs (Brown et al. 2019).

Labor migrants tend to be economically successful taxpayers, and are less likely than natives to use welfare benefits (Giulietti and Wahba 2013). In the EU, the generosity of unemployment benefit spending across EU countries in 1993–2003 had a negligible effect on the inflow of non-EU migrants (Giulietti et al. 2013). In the US, the overall cost of public benefits is substantially less for low-income non-citizen immigrants than for comparable native-born adults and children (Ku and Bruen 2013).

It has been shown that higher share of foreign labor is associated with more equality in developed countries (Kahanec and Zimmermann 2000b, 2014). Social tensions are smaller and attitudes toward migrants are more open if immigrants are selected according to the needs of the labor markets (Bauer et al. 2000). The well-being of natives is shown to be higher in countries with more—and with more diverse—migrants (Akay et al. 2014, 2017).

Immigrants commit fewer offenses and less frequently end up in prison than the native population. For example, the number of illegal immigrants in the US tripled between 1990 and 2013, while the crime rate plummeted (Ewing et al. 2015). Data on migration flows between 145 countries between 1970 and 2000 shows that immigration does not cause terrorism; immigration leads to a decline in terrorist acts, largely because it fosters economic growth (Bove and Böhmelt 2016).

Labor migration, particularly that of undocumented workers, is largely circular migration in the absence of travel barriers, because workers go back home to their families after temporary work episodes abroad (Zimmermann 2014a, b, 2017a, b; Constant et al. 2013; Massey and Pren 2012). Mobility restrictions, paradoxically, create more permanent migrants, because workers, unable to move freely to and from the host country, bring families with them. This scenario selects for migrants who may be less willing to assimilate, and the children of immigrants remain culturally diverse (Galli and Russo 2019). When immigrant workers travel back and forth between their host and home countries, the home countries benefit from their skills, knowledge, and perspective, as well as from investments into local businesses and money they spend at home. Remittances sent home by migrants contribute to the development of some of the world's poorest countries, accounting for over 30% of GDP in Kyrgyz Republic and Tajikistan, around 25% in Haiti and Yemen, and close to 20% in Moldova, Honduras, and El Salvador.[13] In other words, immigrants send home 3–4 times more money than countries receive in development aid.

Given the evidence, open borders policies rather than walls would improve the world's well-being. What are some of the drawbacks? Large inflows of migrants may be disruptive for the welfare system in the short run, even if in the long run the balance is restored. Host country natives may have legitimate concerns about preserving national identity and granting voting rights to the newcomers. Potential higher demand for housing, schooling, medical care, and the accompanying rise in property prices are also important short-run concerns.

In a world where wealth and opportunities are more equally distributed, a smaller number of individuals would be drawn by labor market needs or want to migrate to explore different cultures. More people would prefer to stay to be close to their extended families and friends and the home country culture. Unfortunately, simple solutions such as sending foreign aid to poor countries do not reduce emigration (Clemens and Postel 2018).[14] In fact, rising incomes in developing countries may have the opposite effect at least initially, it will increase mobility among people who need resources to move. Reducing migration from poor countries requires complex solutions to global poverty, inequality, and conflicts. Long-term solutions to migration crisis should involve development of institutions in poor countries, including law and order, property rights, as well as investment in education, reduced corruption, and peaceful governance.

3.5 Conclusions: Politics Versus Economic Evidence

Contemporary border fences are built for much the same set of reasons as ancient walls. We have defense walls against external threats of terrorism and infiltration by insurgents. There are walls that separate conflicting cultures and religions, walls

[13] World Bank Migration and Remittances Data 2018. http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data.

[14] See also footnote 10 and the literature cited there.

that establish ownership of land, barriers that regulate trade, and fences that restrict migration of civilians. The attributes of walls have changed from earthwork, bricks, and masonry to sophisticated structures that include concrete, razor wire, sensors, personnel, dogs, infrared equipment, patrol vehicles, drones, helicopters, planes, and satellites. There are additional invisible walls made of legal and digital barriers to restrict movement of goods and people, and maritime systems to detect unauthorized boats.

Like ancient walls, modern "security walls" are only partially successful in accomplishing their goals. No physical barrier can provide effective protection against homegrown terrorists and modern weapons. No fortification can stop migrants who arrive by air and sea. No wall will reduce the drug flow when most of it crosses the border through legal entry points. More than ever before, walls today are politically motivated, reflecting signaling behavior by governments who wish to appear tough on immigration, and serving the interests of defense industries that stand to benefit from the projects. Economic literature overwhelmingly suggests that policies of more open borders, with less restrictive migration and trade, benefit domestic citizens more than walls. Economic policies are also more effective than walls in dealing with illegal trade and trafficking, while diplomacy is more effective than walls in addressing security. Ignoring rational economic thinking over populist politics comes at a price, a loss in well-being.

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