

SUMMARY

This study investigated for the first time the potential of using the network of international postal flows to approximate socioeconomic indicators typically used to benchmark national wellbeing. The research used aggregated electronic postal records from 187 countries collected by the Universal Postal Union from 2010 to 2014 as a proxy indicator for real-world conditions. The indicators gathered from the international postal network were correlated with fourteen widely used socioeconomic indicators, demonstrating new approaches to approximating indicators such as the Human Development Index (HDI) and Gross Domestic Product (GDP). In addition, the postal data was combined with data from other global networks – trade, migration, international flights, Internet protocol (IP addresses) and digital communications – to produce novel multidimensional connectivity indicators.

BACKGROUND

Timely information on the socioeconomic wellbeing of communities is essential to ensure they receive effective provision of services. Many sources of big data, from mobile data to social media data, have previously been shown to yield useful proxies for socioeconomic indicators (i.e., Eagle et al., 2010; UN Global Pulse, 2015). However, digital data sources typically exhibit deeper penetration in developed economies than in developing ones, and they often rely on expensive technologies such as smartphones and a robust communications infrastructure.

This study analyzed a data source that is undoubtedly ‘big,’ yet represents one of the most established and pervasive long-distance communications networks in the history of mankind. The postal network is the world’s largest physical network with some 680,000 post offices. Every time a letter or a parcel is sent, it leaves many digital traces including the place it was sent from (the origin) and where it was delivered (destination). The Universal Postal Union (UPU), established in 1874, collects electronic data records, or traces, each time a mail item, such as a letter or parcel, is sent across borders. In many cases, these traces come from post offices disconnected from any digital or mobile network.

This research investigated for the first time the potential of the network structure of the international postal network (IPN) to produce proxy indicators for countries’ socioeconomic profiles, analyzing 14 million records of dispatches sent between 187 countries over a four-year period, from 2010 to 2014. This study also examined the relationship between the postal network and several other global networks: the global migration network (Abel and Sander, 2014), the international flights network (Guimera et al., 2005), the IP traceroute network (Shavitt and Shir, 2005), the world trade network (Simoes and Hidalgo, 2011) and the social media density network (State et al., 2015).

The underlying question addressed by this research is whether structural network properties of different flow networks between countries can be used to produce proxy indicators for the socioeconomic profile of a country.

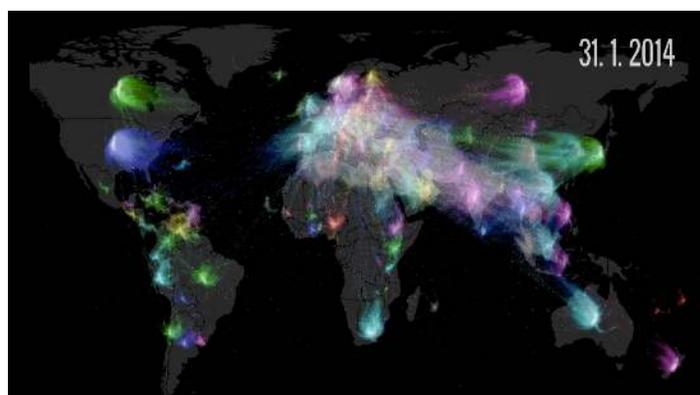


Figure 1: A snapshot of global postal flows from January 31, 2014.

DERIVING PROXIES FOR SOCIO-ECONOMIC INDICATORS FROM GLOBAL NETWORKS

This study produced aggregate measures of each country’s connectivity based on the postal network structure and flows, and then correlated different measures of connectivity with fourteen socioeconomic indicators commonly used by international organizations (including a country’s GDP per capita, human development index (HDI), Gini coefficient, consumer price index (CPI), and poverty rate).

For each network, a country’s degree of connectivity for incoming and outgoing flows was quantified. Furthermore, the study calculated the weighted degree of connectivity of a country based on the postal flows of countries to which it is linked.

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