Michele, for this question, I decided to focus on the spread of the Internet, because I was able to find more research on it and more likely that there will be more relevant data on it.

Research question:

**“What impact did international firms have on native firms In IT industry in connection with the advent of the Internet?”**

So the econometric specification that answers my research question is the following:

Fixed effect

*Y\_ti = α + β \* X\_i + ŋ \* Z\_ti + j\_i + k\_t + ε\_ti*

*X\_ti = ρ + σ \* Z\_ti + j\_i + k\_t + ω\_ti*

Where:

Y – this is the output (or any other value measuring the development) of native firms

X – this is the output (or any other value measuring the development) of international firms

Z – this is a metric of internet distribution (for example, the number of gigabytes used)

It seems that I managed to find the necessary data in the reports on the number of gigabytes used here - https://www.hootsuite.com/pages/digital-trends-2021 . It seems to me that the idea of measuring the spread of the Internet through the number of gigabytes is good, since it can be used to collect data separately by providers and it fully reflects the current need for the Internet. We can also look at the number of users – this is also an indicator that well reflects the need for the Internet and its distribution.

In this case, our coefficients denote the following:

Internet metrics (Z\_I)

***σ***

***ŋ***

***β***

Native firms output (Y\_I)

International firms output (X\_I)

***σ -*** The impact of the development of the Internet on the International firms

***ŋ* -** The impact of the development of the Internet on the Native firms

***β*** – This coefficient exactly answers the question of what impact international companies have on the output of native firms, and this coefficient will be the answer to our question

It seems to me that in this research we can use data for many countries (I) and several time intervals (t). One key reason why we should use different periods of time is that measurable effect would be really long-term one so it’s not correct trying to find the effect next day after the International firm came into the country. Next, I will try to explain why we want to build the research in this way more detailed.

So, our strategy:

1. Outline the circle of countries and the time interval that will be covered by the research. The discussion on this topic can be read below, in the section "Risks and concerns”
2. Collect observations of the following type: (County, T, X, Y, Z) - that is, for a specific country at a specific moment, look at three indicators: the spread of the Internet (Z); the output of domestic firms (Y), the output of international firms (X)
3. Run these observations through there regression model
4. Calculating the coefficient ***β*** – this will be our conclusion and answer to the question “what impact do international companies have on native companies as the Internet spreads”

Of course, in this approach we will also need to use control variables to track the difference between countries (population; GDP, income level, etc.). We can use the Fixed effect model for these variables (as shown at the econometric specification)

Now we will show the mechanisms through which international companies can influence their native firms:

* Negative impact:
* Competition. Foreign companies can absorb or displace native companies in the country from the market, since they will be much larger and more influential. For example, Sendit (Sweden, 1999) and Maximal Innovative Intelligence (Israel, 2001) by Microsoft¹
* By occupying a large part of the market, foreign companies raise barriers to entry to the market like any large companies. Due to this, the development of native firms may slow down
* Employee migration. The arrival of international companies facilitates the migration path for people. Horizontal mobility is more common in international companies. Due to this, the best employees can leave to work in other international offices of these companies
* Positive impact:

I remember that you advised me using the logic of the production function for international companies when searching for such factors. However, without considering a specific firm, we can simply use the following formula X(K;L) and divide this influence into two types of factors labor (L) and capital (K).

When It comes to Labor effects (L):

* Education of the employees. Working in an international company can allow the local population to acquire the skills necessary for the development of their own industries
* Increased incentives to learn. The opportunity to work in an international company motivates people to get new skills necessary to work in this industry (programming, English). These abilities can help to develop their own companies in the future
* Developing the ideas from the previous paragraph, we can mention the increase in the number of educational programs due to the growing demand for education. The logic is as follows: people want to work in an international company – people want to learn English more – there is more demand for learning it - education is developing - development education increases the literacy of the population and increases the chances of developing native firms
* Blue-collar workers. The manufactures itself can also be removed to the country, for example, Apple². Accordingly, the demand in this market may cause the development of this segment of the labor market. However, this argument is quite controversial, since it is clear that there are not an infinite number of such workers in the country and international companies can provide better working conditions (for example, wages), which will cause an outflow of such personnel from native companies

As for capital (K), here I can list everything that international companies are in demand for:

* Offices. International companies will locate their representative offices in the new country and will demand office space or build them by themselves
* Technical equipment. International companies will need, for example, computers for offices, which they can purchase domestically. Thus, they will provide development for this segment of the market.
* Soft products. International companies will need additional technological services. In order to satisfy them, new companies will appear that supply, for example, security systems, data warehouses, access programs - auxiliary IT solutions
* Production facilities. International companies can move production to the country (the same Apple) and build production facilities or develop the current infrastructure
* Materials and spare parts. In case of transfer of production to the country, international companies may need spare parts for their production or basic materials (for example, plastic)
* Energy. Both office and industrial areas require large energy consumption, which companies will not be able to import and will consume local energy and will develop this area
* Production technology. The development of factories is impossible without localization of production technologies. Thus, local specialists will be able to master the production technology of an international company, which will develop them and, in the future, may have an effect on their native production

**Risks and concerns**

So why do I want to use IV here, why does this approach answer the question I posed? This method suits us, because if we just investigating the relationship between (Y\_i; X\_i), that is, the influence of International firms output on Native firms output, then we would not take into account that there is an inverse influence, in other words, we cannot strictly assert that Y\_i is a dependent variable, and X\_i is a regressor. We would not take into account the following impact:

Native firms output (Y\_I)

International firms output (X\_I)

In other words, these variables are endogenous - they influence each other within the formation of the country's internal market.

To measure the effect that is interesting for us (the influence of international companies on native ones), we need an exogenous factor for both variables. In this model, such a factor is the emergence and development of the Internet, which, of course, affects both factors and allows us to control the influence we need.

Some doubts about this approach.

It’s only works when we believe that the availability of the Internet or its specific indicators (for example, the number of gigabytes consumed) is exogenous. But in reality, it seems to me that the spread of the Internet, as well as its appearance, is not entirely exogenous, but depends on the release of companies, both international and native, that is, in reality, the impact may be as follows:

Internet metrics (Z\_I)

Native firms output (Y\_I)

International firms output (X\_I)

Let me explain what I mean. For example, a large number of technology companies in the United States have increased the chance of the ”birth" of the Internet exactly in this country. And many technology companies (which were working there before the Internet distribution) in Europe has accelerated its spread.

That is why, as I mentioned earlier, it would be more logical to use many countries in the study and look at several time intervals to increase the exogeneity of the Internet for our indicators. I can also focus only on developing countries, for which the emergence of the Internet was more likely to be an exogenous one.

So here I need your advice on this issue. Are my doubts fair, or can we use all countries and not worry about the exogeneity of the Internet? Will we be able to measure its exogeneity with the available data?

Sources:

1. List of acquisitions by Microsoft - <https://en.wikipedia.org/wiki/List_of_mergers_and_acquisitions_by_Microsoft>
2. Removing Apple’s manufacturing to India –

<https://www.business-standard.com/article/companies/apple-plans-to-move-10-of-its-global-manufacturing-to-india-in-5-years-120080300042_1.html>