Measuring Multinational Enterprise Activity With The Knowledge-Capital Model

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Introduction

The knowledge-capital model explains why a firm may own or control production in another country rather than export from home or contract with an independent foreign producer. It combines two classic motives for multinational enterprise activity. Horizontal foreign direct investment duplicates similar production in multiple markets to save trade and market-access costs. Vertical foreign direct investment separates stages of production across countries to exploit differences in factor prices, skills, resources, or capabilities. The original essay correctly recognized these motives but confused several statistical concepts. The Organisation for Economic Co-operation and Development is not a dependent variable, thirty countries do not create 870 countries, and foreign direct investment is not calculated by multiplying an “OECD sample” by time. A valid empirical project must distinguish the theoretical outcome, the unit of observation, the variables, and the statistical data used to measure each concept.

The Knowledge-Capital Theory

Knowledge-based assets such as technology, brands, management systems, patents, and organizational routines can often be used in more than one location without being fully consumed. This creates a reason for firms to internalize those assets within a multinational network. In the horizontal case, a firm places production near customers when market size is large and trade costs are high. The foreign affiliate resembles the parent’s home production. In the vertical case, the firm locates skill-intensive headquarters or research activities where skilled labor is relatively abundant and routine production where other inputs are less expensive. The knowledge-capital model permits both patterns and predicts that observed activity depends on market size, similarity, differences in skill endowments, trade costs, and investment barriers.

Reality is often more complex than a clean horizontal-versus-vertical distinction. An affiliate may serve a host market, export to third countries, purchase inputs from related firms, and perform specialized research at the same time. Global value chains can combine market access, tax, logistics, resilience, resource, and knowledge motives. The model should therefore be treated as a disciplined framework for generating testable predictions, not as a claim that every multinational belongs to one category.

Defining the Outcome to Be Measured

The dependent variable should represent multinational activity for a country pair, year, and direction of investment. Possible outcomes include bilateral affiliate sales, employment, assets, value added, number of affiliates, FDI positions, or FDI flows. These variables are related but not interchangeable. A flow records investment transactions during a period; a position records the accumulated value at a point in time. Affiliate sales measure operating activity rather than financing. OECD's 2025 Benchmark Definition describes direct investment as a lasting cross-border interest, generally evidenced by ownership of at least 10 percent of voting power. Control of an enterprise and a direct-investment relationship are also distinct because significant influence may exist below majority ownership. (OECD, 2025)

For a panel of thirty economies, directed country pairs would normally be created by matching each potential parent economy with each different host economy. That produces 30 × 29 = 870 directed pairs, not 870 countries. If observations cover twenty-two years and all pairs are complete, the maximum would be 19,140 pair-year observations. Missing data, zero activity, changes in country coverage, and reporting asymmetry reduce the usable sample. The project must document these choices rather than simply deleting years because "huge amounts" appear missing.

Independent and Control Variables

Market Size and Similarity

The combined GDP of the parent and host captures total market size. Horizontal activity is generally expected to increase when the combined market is large. A measure of GDP similarity or difference tests whether activity is stronger between similarly sized economies, as horizontal theory predicts. GDP should be measured consistently—using current prices, constant prices, or purchasing-power-parity measures according to the research question—and transformed carefully when logarithms are used.

Skill Differences and Factor Endowments

Differences in skilled-labor abundance are central to vertical predictions. Researchers may use educational attainment, skilled-worker shares, wages, or human-capital indices. The direction of the difference matters because the parent is expected to locate knowledge-intensive functions where skills are abundant. Older educational datasets can be useful for historical replication, but a new project should explain coverage, interpolation, and comparability rather than treating one source as universally valid.

Trade Costs, Investment Costs, and Distance

Trade costs can be represented by tariffs, transport costs, geographic distance, common borders, language, or trade-policy indicators. Investment barriers may include ownership restrictions, regulatory quality, political risk, tax treatment, and institutional distance. The knowledge-capital model often predicts interactions: for example, the effect of skill differences may depend on trade costs and market size. Omitting these interactions can make an empirical specification inconsistent with the theory it claims to test.

Estimation Strategy

A panel model uses repeated observations for country pairs over time. Pair effects can absorb stable characteristics such as distance, while year effects can capture global shocks. Country-year effects may control for changing macroeconomic conditions in parent and host economies. Researchers must consider that FDI values are skewed, may include zeros or negative flows, and may be affected by corporate restructuring and pass-through funds. Log-linear ordinary least squares is not automatically appropriate when zeros are common. Alternative estimators, robust standard errors, and sensitivity tests should be justified.

Causality is another challenge. Market size may attract FDI, but multinational activity can itself affect output, skills, trade, and policy. Governments may change investment rules in response to expected projects. Researchers can use lagged variables, policy changes, instrumental strategies, or careful language that limits conclusions to association. Spatial dependence also matters because investment in one country may complement or substitute for investment in neighboring locations.

Cases, Data, and Measurement Quality

The original 1982–2003 OECD sample can be retained as a historical replication if the purpose is to evaluate earlier knowledge-capital studies. In that case, the essay should identify the exact database vintage, country list, bilateral direction, currency treatment, deflator, and missing-data rules. A contemporary extension should use internationally harmonized data and acknowledge changes in FDI statistics. OECD’s fifth Benchmark Definition adds more analytical detail, including investment purpose—greenfield investment, capacity expansion, mergers and acquisitions, and restructuring—as well as ultimate investor and pass-through-fund concepts. These distinctions help prevent large financial transactions from being mistaken for equivalent changes in productive multinational activity.

Affiliate activity statistics can sometimes test the theory more directly than financial FDI flows because they measure employment, sales, assets, or value added where multinational enterprises operate. Yet they have their own limitations, including confidentiality, incomplete coverage, and inconsistent reporting. A strong study triangulates more than one outcome or explains why one is

preferred.

Research Logic and Project Value

The research logic should begin with explicit hypotheses. Horizontal theory predicts stronger activity between large, similar economies when serving a market locally avoids trade costs. Vertical theory predicts activity when countries differ in skill abundance and stages can be separated profitably. The unified model predicts combinations and interactions. The regression then evaluates whether the signs and magnitudes of coefficients are consistent with those predictions. Statistical significance alone is insufficient; economic magnitude, model fit, residual patterns, and robustness also matter.

The project's value lies in translating a complex theory into measurable country-pair evidence while exposing the limits of aggregate data. It can show that multinational activity is shaped by market access and production fragmentation rather than a single motive. It can also demonstrate why definitions matter: an FDI position, a flow, affiliate sales, and control of an enterprise describe different dimensions of globalization. Future work could compare industries, distinguish greenfield projects from acquisitions, examine services and digital firms, or test whether supply-chain resilience has altered traditional location decisions.

Illustrative Hypotheses

A transparent model could state four hypotheses before estimation. First, bilateral multinational activity should rise with the combined economic size of the parent and host. Second, horizontal activity should be stronger when the two markets are similar in size and trade costs make exporting expensive. Third, vertical activity should rise with relevant differences in skill abundance when production stages can be separated. Fourth, investment barriers should reduce activity, while their interaction with trade costs may alter whether firms export or establish affiliates.

The hypotheses should be connected to coefficient expressions rather than discussed only in prose. If the specification includes squared GDP differences or interaction terms, marginal effects may change across values. Reporting a single coefficient without calculating the combined effect can misrepresent the model. Graphs of predicted activity across market similarity and skill differences can make the theory easier to interpret.

Robustness and Reproducibility

A reproducible project should provide a data dictionary, source links, transformation rules, code, country coverage, and a record of exclusions. Robustness checks might compare FDI stocks with affiliate sales, use alternative skill measures, remove financial centers, distinguish manufacturing from services, and test periods before and after major policy changes. Results should be examined for

influential country pairs and sensitivity to zeros.

The paper should also discuss what would count as evidence against the model. If predicted interactions are unstable, signs reverse across reasonable specifications, or financial restructuring dominates the outcome, the conclusion may be that aggregate data cannot cleanly identify horizontal and vertical motives. A useful research project can clarify limitations even when it does not confirm every theoretical prediction.

Conclusion

The knowledge-capital model is a useful bridge between horizontal and vertical theories of multinational enterprise. A credible empirical application must define the unit of observation, select a defensible measure of multinational activity, construct market-size and skill variables correctly, incorporate trade and investment costs, and address panel-data limitations. OECD is a source and institutional framework, not the dependent variable. Thirty countries create directed pairs, not hundreds of additional countries. With these corrections, the model becomes a powerful tool for studying where firms locate activity, why they choose ownership rather than arm's-length exchange, and how international production responds to changing markets and capabilities. (Carr et al., 2001; Markusen, 2002)

Works Cited

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