57_Eswatini

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1 How have payments and receipts for the use of intellectual property evolved relative to each other in Eswatini between 1978 and 2023?

1.1 Abstract

Using World Bank World Development Indicators (WDI) data, this study examines the evolution of Eswatini's international intellectual property (IP) transactions between 1978 and 2023, focusing on payments and receipts for the use of intellectual property as recorded in the balance of payments (BoP). These indicators provide insight into the country's engagement with global knowledge flows, technological exchange, and participation in innovation-related trade. Over the period, payments for the use of intellectual property increased substantially until 2009, when they dropped sharply—nearly reverting to their initial level. In the years following, payments rose again, but at a more moderate pace, ending the period moderately above their starting value. In contrast, receipts remained consistently minimal across the entire timeframe, with the exception of a sharp but short-lived spike in 2008. This divergence illustrates Eswatini's role primarily as a net payer for intellectual property, highlighting asymmetries in technology transfer, innovation capacity, and the commercialization of domestic knowledge outputs.

1.2 1. Question

How have payments and receipts for the use of intellectual property evolved relative to each other in Eswatini between 1978 and 2023?

- **Payments proxy**: Charges for the use of intellectual property, payments (BoP, current USD)
- **Receipts proxy**: Charges for the use of intellectual property, receipts (BoP, current USD)

1.3 2. Data

- **Source**: World Bank World Development Indicators (WDI)
- **Indicators**:
  - Charges for the use of intellectual property, payments (BoP, current USD)
  - Charges for the use of intellectual property, receipts (BoP, current USD)
- **Coverage**: Eswatini, 1978–2023
- **Notes**: National-level data only

1.4 3. Method

1. Filtered the dataset for Eswatini and selected the two IP trade indicators.

2. **Extracted relevant columns**: Year, Indicator Name, and Value.
3. Pivoted the data to create a chronological comparison of payments and receipts.
4. Produced a dual-line time series plot to visualize magnitude differences, volatility, and divergence over time.

(Analysis is descriptive; no causal inference applied.)

1.5   4. Results

- **Payments for intellectual property use**: Increased sharply from 1978 to 2009, followed by a steep decline back toward initial levels. After 2009, payments resumed a moderate upward trend, ending the period modestly higher than in 1978.
- **Receipts for intellectual property use**: Remained very low throughout the entire period, except for a single-year surge in 2008, after which they returned to near-zero levels.
- **Comparison**: Payments consistently exceeded receipts by a wide margin, revealing Eswatini's sustained position as a net importer of intellectual property rights.

(Figure 1. Eswatini: Payments vs. Receipts for the Use of Intellectual Property (BoP, current US$), 1978–2023)

(Table 1. Pivoted dataset summary)

1.6   5. Interpretation

- The early surge in payments suggests growing exposure to global intellectual property systems, likely driven by importation of foreign technologies, software, and industrial licenses.
- The sharp drop after 2009 may reflect changes in foreign investment, policy reforms, or macroeconomic adjustments affecting external obligations.
- The persistent insignificance of receipts underscores Eswatini's limited role in exporting or licensing locally developed intellectual property.
- The large and enduring gap between payments and receipts highlights structural asymmetries in knowledge production, innovation infrastructure, and technology commercialization capacity.

1.7   6. Limitations

- Balance of payments data may not capture informal or unrecorded intellectual property transactions.
- Cross-country comparability can be limited due to differences in IP accounting methods.
- Descriptive trends do not directly identify causal factors such as foreign investment patterns, trade policy, or industrial strategy shifts.

1.8   7. Next Steps / Extensions

- Examine correlations between intellectual property payments and foreign direct investment (FDI) inflows to understand how technology imports shape domestic production.
- Investigate whether policy incentives for innovation, R&D, or creative industries have influenced IP receipts.
- Compare Eswatini's IP transaction trends with those of neighboring Southern African economies to contextualize its integration into regional knowledge systems.

- Explore how education, digital infrastructure, and firm-level innovation could strengthen Eswatini's capacity to generate and export intellectual property in the future.

```python
[2]:  # How have payments and receipts for the use of intellectual property evolved␣
      ↪relative to each other in Eswatini between 1978 and 2023?

      import pandas as pd
      import matplotlib.pyplot as plt
      import os

      # Folders
      data_raw_folder = "data_raw/"
      data_clean_folder = "data_clean/"
      figures_folder = "figures/"

      # Load CSV
      filename = "science-and-technology_swz_filtered.csv"   # Filtered dataset with␣
       ↪only relevant rows
      df = pd.read_csv(os.path.join(data_raw_folder, filename))

      # Keep only needed columns
      df = df[["Year", "Indicator Name", "Value"]]

      # Convert Year and Value to numeric, drop invalid rows
      df["Year"] = pd.to_numeric(df["Year"], errors="coerce")
      df["Value"] = pd.to_numeric(df["Value"], errors="coerce")
      df = df.dropna(subset=["Year", "Value"])

      # Pivot indicators into separate columns
      df_pivot = df.pivot(index="Year", columns="Indicator Name", values="Value").
       ↪reset_index()
      df_pivot = df_pivot.sort_values("Year")

      print("Pivoted Eswatini dataset:")
      display(df_pivot)

      # Interpolate missing values for smooth plotting (optional)
      df_plot = df_pivot.interpolate(method='linear')

      # Plot the indicators
      plt.figure(figsize=(10,6))
      plt.plot(df_plot["Year"], df_plot["Charges for the use of intellectual␣
       ↪property, payments (BoP, current US$)"],
              marker='o', linestyle='-', label="Charges for the use of intellectual␣
       ↪property, payments (BoP, current US$)")
      plt.plot(df_plot["Year"], df_plot["Charges for the use of intellectual␣
       ↪property, receipts (BoP, current US$)"],
```

```
        marker='o', linestyle='-', label="Charges for the use of intellectual␣
↪property, receipts (BoP, current US$)")

plt.title("Eswatini: Payment vs Receipt charges for the use of intellectual␣
↪property  (BoP, current US$) (1978-2023)")
plt.xlabel("Year")
plt.ylabel("Amount (in hundreds of millions of dollars)")
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.savefig(os.path.join(figures_folder,␣
↪"eswatini_payment_vs_receipt_charges_for_the_use_of_intellectual_property.
↪png"))
plt.show()

# Save cleaned CSV
df_pivot.to_csv(os.path.join(data_clean_folder,␣
↪"eswatini_payment_vs_receipt_charges_for_the_use_of_intellectual_property"),␣
↪index=False)
```

```
Pivoted Eswatini dataset:

Indicator Name  Year  \
0               1978
1               1979
2               1980
3               1981
4               1982
5               1983
6               1984
7               1985
8               1986
9               1987
10              1988
11              1989
12              1990
13              1991
14              1992
15              1993
16              1994
17              1995
18              1996
19              1997
20              1998
21              1999
22              2000
23              2001
24              2002
```
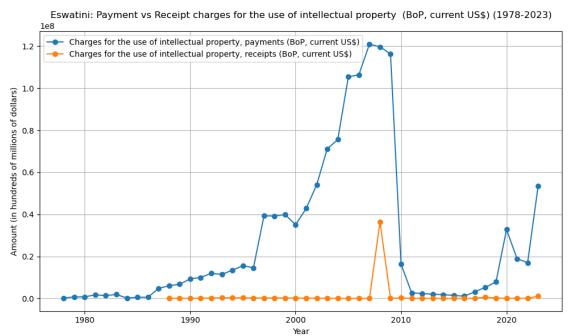
```
25          2003
26          2004
27          2005
28          2006
29          2007
30          2008
31          2009
32          2010
33          2011
34          2012
35          2013
36          2014
37          2015
38          2016
39          2017
40          2018
41          2019
42          2020
43          2021
44          2022
45          2023

Indicator Name  Charges for the use of intellectual property, payments (BoP,␣
 ↪current US$)  \
0                                                           2.300000e+05
1                                                           7.125699e+05
2                                                           7.703827e+05
3                                                           1.709248e+06
4                                                           1.381450e+06
5                                                           1.884930e+06
6                                                           2.033516e+05
7                                                           5.833062e+05
8                                                           5.689199e+05
9                                                           4.764166e+06
10                                                          6.070023e+06
11                                                          6.748828e+06
12                                                          9.314655e+06
13                                                          9.995238e+06
14                                                          1.192140e+07
15                                                          1.147459e+07
16                                                          1.342881e+07
17                                                          1.557449e+07
18                                                          1.459105e+07
19                                                          3.926964e+07
20                                                          3.925431e+07
21                                                          3.990206e+07
22                                                          3.506484e+07
```

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23                                        4.280036e+07
24                                        5.407539e+07
25                                        7.118108e+07
26                                        7.560143e+07
27                                        1.054331e+08
28                                        1.064056e+08
29                                        1.209881e+08
30                                        1.196907e+08
31                                        1.163404e+08
32                                        1.630875e+07
33                                        2.678419e+06
34                                        2.362605e+06
35                                        2.006990e+06
36                                        1.811255e+06
37                                        1.424807e+06
38                                        1.097573e+06
39                                        3.173477e+06
40                                        5.333010e+06
41                                        7.837970e+06
42                                        3.278551e+07
43                                        1.888508e+07
44                                        1.703937e+07
45                                        5.354760e+07

Indicator Name   Charges for the use of intellectual property, receipts (BoP,␣
 ↪current US$)
0                                                NaN
1                                                NaN
2                                                NaN
3                                                NaN
4                                                NaN
5                                                NaN
6                                                NaN
7                                                NaN
8                                                NaN
9                                                NaN
10                                        8.797135e+04
11                                                NaN
12                                        3.865002e+04
13                                        1.086439e+05
14                                        2.103776e+05
15                                        3.121422e+05
16                                        2.928919e+05
17                                        3.027224e+05
18                                        2.279415e+05
19                                        2.387173e+05
20                                        2.351543e+05
```

21	2.127839e+05
22	2.017341e+05
23	1.626171e+05
24	1.423049e+05
25	3.767475e+04
26	3.993998e+04
27	3.144986e+03
28	2.658181e+03
29	1.314339e+04
30	3.638213e+07
31	3.468106e+04
32	2.595195e+05
33	2.682400e+03
34	6.559046e+03
35	6.935279e+03
36	2.750804e+04
37	2.170983e+04
38	1.617618e+04
39	3.621202e+04
40	6.751567e+05
41	2.124952e+05
42	5.720963e+04
43	7.638297e+04
44	6.685497e+04
45	1.059687e+06

Eswatini: Payment vs Receipt charges for the use of intellectual property (BoP, current US$) (1978-2023)

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[ ]:
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