MUNHUMUTAPA SCHOOL OF COMMERCE

DEPARTMENT OF ECONOMICS

BACHELOR OF COMMERCE DEGREE

LEVEL 1 SEMESTER 2

EXAMINATION QUESTION PAPER

MODULE CODE	**MEC524**
MODULE NARRATION	**ECONOMICS RESEARCH AND COMPUTER APPLICATIONS**
DATE	**2024**
DURATION	**3 HOURS**

INSTRUCTIONS TO CANDIDATES:

1. Answer any four questions
2. All questions carry equal marks
3. Start each answer on a fresh page
4. Show all workings, where applicable

QUESTION 1

The following is an excerpt of an introduction from a paper titled , **"Trade liberalization, technology transfer, and endogenous R&D"** by Hwang et al. (2016) from *Oxford Economic Papers, 68(4).* Read through and answer the questions that follow.

International technology transfer has been burgeoning in the world. Many firms in developing countries, such as China, endeavor to catch up to the technology ladder via technology transfer from developed countries and then to become more competitive in a global market. It has been argued that a government can use a trade protection policy to induce foreign firms to transfer their superior technology to domestic firms, e.g., Kabiraj and Marjit (2003) and Mukherjee and Pennings (2006), among others. By employing an international duopoly Cournot model and treating the technology level as an endogenous variable, we shall show that a more superior technology will be transferred from abroad as trade barriers decrease. That is to say, a less restrictive trade policy can help the domestic firm acquire more advanced technology, a result which has not been documented in the literature. The literature on trade policies and the protected firm's technology choice is quite vast. For example, Reitzes (1991) shows that quotas and tariffs often result in opposite effects on the protected firm's R&D investments. Miyagiwa and Ohno (1995) find that a permanent tariff accelerates the protected firm's technology adoption, while a permanent quota pro- crastinates on the protected firm's adoption unless the quota is highly restrictive. Furthermore, Chiou et al. (2006) assume there is a foreign firm competing with a domestic firm in the domestic market and compare the effects of a tariffs and the equivalent quota on the domestic firm's technology choice. They find that the technology level chosen by the protected firm is necessarily higher under a tariff than the equivalent quota if the two firms compete in Cournot fashion, but the ranking is ambiguous if the two firms compete in Bertrand fashion. However, all these papers focus on how trade policies affect the protected firm's indigenous technology choice, and fail to capture another technology development channel that firms can upgrade their technology through international technology licensing. The main purpose of this paper is therefore to investigate how trade protection affects the foreign firm's R&D, which in turn affects the technology level transferred to the domestic protected firm.

There is an extensive body of literature that investigates the relationship between trade policies and international technology licensing. Some of them are specifically relevant to our paper, including Kabiraj and Marjit (2003), Mukherjee and Pennings (2006), and Horiuchi and Ishikawa (2009).2 Kabiraj and Marjit (2003) consider a duopoly model where a foreign firm and a domestic firm compete in the domestic country and show that a tariff may induce a technology transfer from the foreign firm to the domestic firm, thereby making consumers in the domestic country better off. Our model differs from theirs in several ways. First, they treat the foreign technology as an exogenous variable whereas we allow the foreign firm to choose endogenously its R&D. Second, they consider only tariff barriers, but we study both tariff and non-tariff barriers and compare their effects on inter- national technology transfers. Finally, they assume the foreign firm adopts fixed-fee licens- ing whereas we assume it chooses royalty as the means of licensing. Mukherjee and Pennings (2006) set up a model in which the foreign monopolist can license its superior technology to either another foreign firm or a domestic firm. They explore how the host government uses a tariff policy to affect the licensing decision and the domestic welfare. Both papers suggest that an increase in tariff encourages international technology transfer. Moreover, Horiuchi and Ishikawa (2009) show that either an increase in tariff which incurs a tariff-jumping effect or a decrease in tariff which results in an entry-deterring effect can induce technology transfer from foreign firms. However, these papers have overlooked the fact that trade policies may alter the R&D behaviour of the foreign firm and the technology level to be transferred to the domestic firm. By treating the R&D of the foreign firm to be endogenously determined, we shall show that trade liberalization can in fact help the domestic firm acquire a better technology as it induces the foreign firm to invest more on its R&D.

With reference to the abstract identify and explain;

(a) The research objective(s) [6 marks]

(b) The research problem [6 marks]

(c) The research contribution(s) [8 marks]

(d) Areas of further research [5 marks]

[TOTAL MARKS: 25]

QUESTION 2

2.1 Discuss any 5 elements that you can focus on in an attempt to make a contribution to the body of knowledge. *[10 marks]*

2.2 Why is the stationarity of a variable importance when analysing data? *[10 marks]*

2.3 Explain a researcher can choose between fixed and random effects model. *[5 marks]*

[TOTAL MARKS: 25]

QUESTION 3

3.1 Full interpret the following results:

```
Fixed-effects (within) regression               Number of obs      =        91
Group variable: id                              Number of groups   =         7

R-sq:                                           Obs per group:
     within  = 0.3452                                         min =        13
     between = 0.2363                                         avg =      13.0
     overall = 0.2570                                         max =        13

                                                F(3,81)            =     14.23
corr(u_i, Xb)  = -0.0400                        Prob > F           =    0.0000
```

roe	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
deposits	-1.12e-12	8.31e-13	-1.34	0.182	-2.77e-12	5.36e-13
totalassets	7.99e-13	5.44e-13	1.47	0.146	-2.83e-13	1.88e-12
infla	.0484975	.008159	5.94	0.000	.0322637	.0647313
_cons	.2201576	.016242	13.55	0.000	.1878411	.2524742
sigma_u	.08471057					
sigma_e	.12746408					
rho	.30636082	(fraction of variance due to u_i)				

F test that all u_i=0: F(6, 81) = 5.54 Prob > F = 0.0001

[15 marks]

3.2 Why are assumptions necessary when estimating a linear regression model?

[10 marks]

[TOTAL MARKS: 25]

QUESTION 4

4.1 Identify the test under consideration and interpret the results;

```
. swilk residuals

                    Shapiro-Wilk W test for normal data

    Variable |        Obs        W         V         z       Prob>z
-------------+-------------------------------------------------------
   residuals |         91    0.96004     3.050     2.461     0.00692
```

[5 marks]

4.2 Explain the instructions contained in the syntax and interpret the results.

```
. ardl ln_inv ln_inc ln_cons, lags(1 1 2) ec

ARDL regression
Model: ec

Sample: 1960q3 - 1982q4
Number of obs   = 90
Log likelihood = 163.06797
R-squared       = .21905632
Adj R-squared   = .16260256
Root MSE        = .04115868
```

D.ln_inv	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
ln_inv						
L1.	-.1495121	.058003	-2.58	0.012	-.2648777	-.0341465
LR						
ln_inc	-2.503991	2.68002	-0.93	0.353	-7.834443	2.826462
ln_cons	3.449802	2.767056	1.25	0.216	-2.053762	8.953365
SR						
ln_inc						
D1.	-.1228696	.4924977	-0.25	0.804	-1.102428	.8566886
ln_cons						
D1.	1.337382	.4768552	2.80	0.006	.3889358	2.285827
LD.	.9315012	.4311061	2.16	0.034	.0740484	1.788954
_cons	-.0467483	.0728322	-0.64	0.523	-.1916087	.098112

[10 marks]

4.3 Explain the key components of the literature review section of a research write up.

[10 marks]

[TOTAL MARKS: 25]

QUESTION 5

5.1 How can a researcher identify a research gap? [7 marks]

5.2 Full explain the following results;

```
. estat ectest

Pesaran, Shin, and Smith (2001) bounds test

H0: no level relationship                                   F =     1.658
Case 3                                                      t =    -2.553

Finite sample (3 variables, 27 observations, 7 short-run coefficients)

Kripfganz and Schneider (2020) critical values and approximate p-values
```

	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	3.024	4.462	3.826	5.531	5.928	8.305	0.350	0.628
t	-2.499	-3.432	-2.908	-3.908	-3.777	-4.924	0.092	0.293

```
do not reject H0 if
    either F or t are closer to zero than critical values for I(0) variables
      (if either p-value  > desired level for I(0) variables)
reject H0 if
    both F and t are more extreme than critical values for I(1) variables
      (if both   p-values < desired level for I(1) variables)

decision: no rejection (.a), inconclusive (.), or rejection (.r) at levels:
```

	10%	5%	1%
decision	.a	.a	.a

[10 marks]

5.3 What are the key attributes of a good research? *[8 marks]*

[TOTAL MARKS: 25]

END OF EXAMINATION